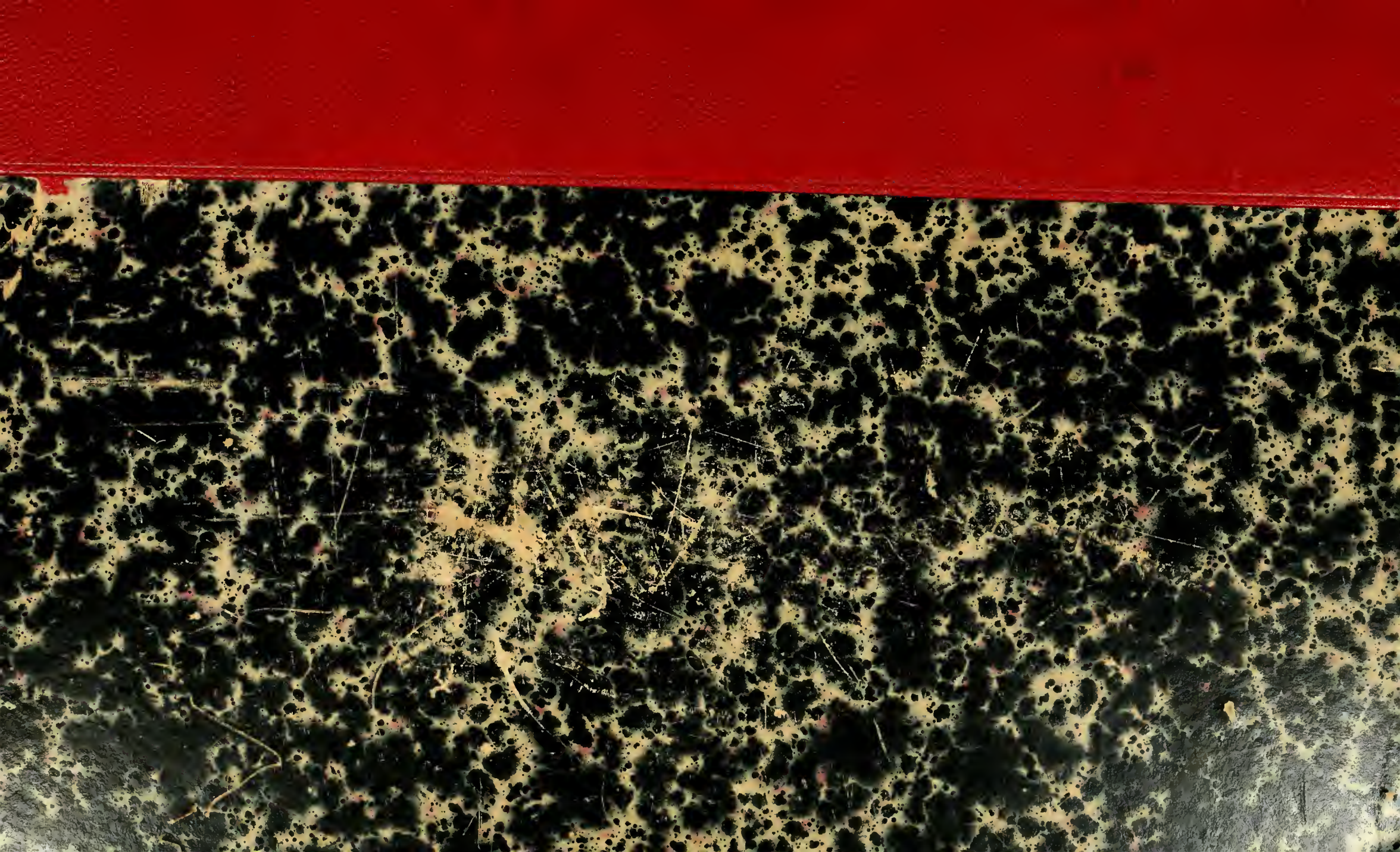

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THE FRESHWATER FISHES OF BRITISH GUIANA, INCLUDING A STUDY OF THE ECOLOGICAL GROUPING OF SPECIES, AND THE RELATION OF THE FAUNA OF THE PLATEAU TO THAT OF THE LOWLANDS.

BY C. H. EIGENMANN, PH.D.

PITTSBURGH.

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OF THE

CARNEGIE MUSEUM

VOL. V.

(PUBLICATIONS OF THE CARNEGIE MUSEUM: SERIAL NO. 67).

W. J. HOLLAND, *Editor.*

PITTSBURGH
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THE FRESHWATER FISHES OF BRITISH GUIANA, INCLUDING A STUDY OF THE ECOLOGICAL GROUPING OF SPECIES AND THE RELATION OF THE FAUNA OF THE PLATEAU TO THAT OF THE LOWLANDS.

By C. H. EIGENMANN, Ph.D.

Dean of the Graduate School of the Indiana State University, and Curator of Ichthyology in the Carnegie Museum.

PREFATORY NOTE

The following pages, constituting the Fifth Volume of the Memoirs of the Carnegie Museum, embody the results of the investigations made by Dr. C. H. Eigenmann upon the piscine fauna of the rivers of British Guiana.

Having been granted temporary leave of absence from the Indiana State University, where he is the Dean of the Graduate School, Dr. Eigenmann went to British Guiana in the fall of 1908, having the assurance of the financial support of the Carnegie Museum, both in meeting the expenses of his expedition and in publishing the results thereof. The typical portions of the collections made by him are preserved in the Carnegie Museum, including all *unica*. A second set, including, so far as possible, cotypes of the new species, was reserved for the Indiana State University. It has been arranged to dispose of the remainder of the collection by exchange with the leading museums of America and Europe.

The Editor, in presenting this work to the scientific public, is animated by the hope that it may prove of value to the students of biology in all parts of the world, and tend to shed at least a little light upon some of the countless problems which confront the student of vital phenomena.

W. J. Holland.

Pittsburgh, Dec. 1, 1911.

LETTER OF TRANSMITTAL

Dr. W. J. Holland,

Director Carnegie Museum, Pittsburgh, Pa.

My dear sir:

By accident you and I came to occupy contiguous seats in an excursion from Colorado Springs to Cripple Creek, after the close of the Denver meeting of the American Association for the Advancement of Science in 1901.

I am transmitting one of the indirect results of that pleasant ride. Since that chance meeting we have frequently discussed South America, a continent in which a growing series of converging interests meet, the continent which served as the training ground of Spix, Martius, Castelnau, Müller, Darwin, Bates, Wallace, Agassiz, and Hatcher, a land in which there is a great wealth of many sorts of animals and plants, and in which fresh-water fishes have evolved in the greatest profusion, a continent which will in the centuries to come furnish homes to countless millions of men.

I have been interested in South American fresh-water fishes for twenty-five years. A little over two years ago it became necessary in continuance of my work to visit British Guiana. The Trustees of Indiana University gave me leave of absence. I applied to various other institutions for assistance, but met everywhere with refusals. When I visited you in August, 1908, on my way to Guiana, you pledged the Carnegie Museum to help. Both the authorities of Indiana University and you have done everything possible to bring my report to a successful conclusion. It is a great satisfaction to me that the assistance furnished by the Carnegie Museum has brought it such rich returns in valuable specimens. Since my return from Guiana in December, 1908, all of the material collected has been examined, and the results of the examination together with an account of the Guiana Expedition are herewith transmitted for publication. This paper was prepared in the Zoölogical Laboratory of Indiana University and forms "Contribution No. 114" of that laboratory.

Cordially yours,

C. H. Eigenmann.

December 1, 1910.

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ERRATA ET CORRIGENDA

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Page 20, No. 59. For "*Potamorhaphis*" read "*Potamorrhaphis*."

Page 20, No. 64. For "*Crenichla*" read *Crenicichla*.

Page 22, No. 20. For "*bimaculata*" read *bimaculatum*.

Page 24, No. 64. For "*platyura*" read *platyurus*.

Page 29. For "*Xiphoramphus*" read *Xiphorhamphus*.

Page 43, No. 1. For "*Xenacara*" read *Xenocara*.

Pages 57; 68, No. 259; 90, No. 27 and No. 13; 93, No. 51. For "*dichrourus*" read *dichroura*.

Page 57. For "*melanditus*" read *melandetus*.

Page 66, No. 112. For "*piperatus*" read *piperata*.

Pages 68, No. 260; 79; 88, No. 99; 90, No. 28 and 14; 97 No. 70; 112. For "*lepidurus*" read *lepidura*.

Pages 69, No. 306; 80; 114, No. 99. For "*siebenthali*" read *siebenthalæ*.

Page 70, No. 363. For "*Hydrocynnus*" read *Hydrocynus*.

Page 70, No. 378. For "*Gymnorbamphichthys*" read *Gymnorhamphichthys*.

Pages 70, No. 346; 81; 254; 257. For "*Hydrolicus*" read *Hydrolycus*.

Page 71, No. 412. For "*viripera*" read *viripara*.

Page 73, No. 493. For "*Colemosus*" read *Colomesus*.

Page 73, No. 490. For "*Archirus*" read *Achirus*.

Page 79. For "*profundis*" read *profunda*.

Page 79. For "*Agoniatus*" read *Agoniates*.

Pages 83 and 92, No. 29. For "*maroni*" read *maronii*.

Page 90, No. 26. For "*chrysargyreus*" read *chrysargyrea*.

Pages 92, No. 28; 98, No. 131. For "*Nannocara*" read *Nannacara*.

Page 93, No. 34. For "*alburnus*" read *alburna*.

Page 93, No. 77. For "*Nannocara bimaculatum*" read *Nannacara bimaculata*.

Page 93, No. 80. For "*punctulatum*" read *punctulatus*.

Page 93, No. 82. For "*Soleonasis*" read *Soleonasus*.

Page 96, No. 28. For "*guianensis*" read *guianense*.

Page 96, No. 64. For "*calceus*" read *chalceus*.

Pages 97, 99. For "*Gasteropelicina*" read *Gasteropelecina*.

Page 97. For "*Gasteropelicus*" read *Gasteropelecus*.

Page 98, No. 144. For "*Archiurus*" read *Achirus*.

Page 104, No. 13. For "*Charicidium*" read *Characidium*.

Page 105, No. 16. For "*Aphyocarax*" read *Aphyocharax*.

Page 108. For "*bilineatus*" read *bilineata*.

Page 114, No. 73. For "*shidleri*" read *shideleri*.

Page 114, No. 85. For "*strictus*" read *stictus*.

Page 114, No. 88, and page 349. For "*hyphessus*" read *hyphesson*.

Page 119. For "Lophibranchii" read Lophobranchii.

Page 125. For "*hexadactlus*" read *hexadactylus*.

Page 151. For "*acanthocheira*" read *acanthochira*.

Page 256. For "Pygopristes" read Pygopristis.

Page 257. For "Roeboides" read Rœboides.

Page 258. For "*Acestrorhamphinæ*" read *Acestrorhynchinæ*.

Page 283. For "*anomalum*" read *anomalus*.

Page 434. For "*mülleri*" read *muelleri*.

Page 442. For "*marmoratus*" read *marmorata*.

Page 469. For "*jauclidens*" read *jaculidens*.

Page 487. The matter on this page should have been printed on page 488, and *vice versa*. The printer transposed the forms.

Pl. LXII. For "*Stoleferus*" read *Stolephorus*.

Pls. LXV, LXVI. For "*Nannachara*" read *Nannacara*.

Page. 531.[1] After line 14 from bottom add:

—. Contributiones al conocimiento de los Peces Sudamericanos, especialmente de los de la República Argentina.—*Anales del Museo Nacional de Buenos Aires*, V, 1897, 263–302.

Page 531. Line 11 from bottom, for "163" read 165.

Page 532. After line 18 add:

—. On New Siluroid Fishes from the Andes of Columbia.—*Annals and Magazine Natural History* (5), XIX, 1887, 348–350.

Page 532. Transfer lines "3 and 4" from bottom to become lines 5 and 6 from bottom of page 554.

Page 534. 14th line from bottom, for "118" read 108.

Page 534. After line 10 from bottom add:

—. Sur les Poissons du sous-genre Mylètes.—*Mémoires Muséum d'Histoire Naturelle*, IV, *Paris*, 1818, 444–456, pls. 21 and 22.

—. Sur les Poissons du sous-genre Hydrocyn, sur deux nouvelles espèces de Chalceus, sur trois nouvelles espèces de Serrasalmes, et sur l'Argentina glossodonta de Forskahl, qui est l'Albula gonorhynchus de Bloch.—*Mémoires Muséum d'Histoire Naturelle*, V, *Paris*, 1819, 351–379.

Page 534. Omit last line.

Page 538. Line 27, for "Callophysys" read *Callophysus*.

Page 540. To line 27 add: *Annals and Magazine of Natural History* (3), XIV, 1864, 227–232.

Page 541. Line 20 from top and page 548, line 15 from bottom, for "Demarara" read Demerara.

Page 542. Instead of line 3 read:

—. Mémoire sur l'Eremophilus et l'Astroblepus, deux nouveaux genres de l'Ordre des Apodes.—*Recueil d'Observations de Zoölogïe et d'Anatomie Comparée*, I, 1805, 33–38 and 1811, 17–20, pls. vi–vii.

—. Mémoire sur une nouvelle Espèce de Gymnote de la rivière de la Madeleine. —*Recueil d'Observations de Zoölogie et d'Anatomie Comparée*, I, 1806, 78–80 and 1811, 46–48, pl. x.

Page 542. Line 16 from bottom, for "Notes" read Notas.

Page 545. Line 8 from bottom, for "abbildung" read Abbildungen.

Page 546. After line 19 add:

—. Sur les pharyngiens inferieur chez les Poissons du genre Orestias.—*Comptes Rendus des Seances de l'Academie des Sciences*, Oct., 1904.

Page 548. Line 14, after "*Retroculus*" add *Geophagus*.

Page 548. Line 24, for "Diagnosis" read Diagnoses.

Page 548. Line 26, for "of Mexico" read from Mexico.

[1] No proof of the bibliography pages 530–554 reached the author. This fact must be offered as an excuse for the numerous changes and additions made here. C. H. Eigenmann.

Page 548. Line 32, add: Maps 1 and 2, Tab. 1–26.
Page 549. Line 14, for "535" read 553.
Page 550. Line 21, for "den" read der.
Page 550. Line 9 from bottom, for "LXX" read LXIX.
Page 550. Line 8 from bottom, for "Kentniss" read Kenntniss.
Page 550. Line 2 from bottom, for "Characinen" read Characinen.
Page 551. Line 8, for "1879" read 1878.[1]
Page 551. Line 12, for "1897" read 1879.
Page 551. Lines 13, 19, 21, for "Flüssfische" read Flussfische.
Page 551. Line 22, for "1882" read 1881.[1]
Page 551. Line 26, and line 30, for "1883" read 1882.[1]
Page 551. Line 32, for "1888" read 1887.
Page 551. 5th line from bottom, add: "Taf. XV–XXI."
Page 552. Line 1, for "1905" read 1903.
Page 552. Line 2, for "204" read 214.
Page 552. Line 9, after "Über" add zwei.
Page 552. Lines 11 and 23, omit [not seen].
Page 552. After line 13 add: Ueber eine neue *Coridoras*-Art aus dem Rio Preto, einem sekundären Nebenflusse des Rio San-Francisco, und eine *Xenocara*-Art aus dem Parnahyba bei Victoria und Sa. Filomena ferner über die weite geographische Verbreitung von *Anacyrtus* (*Raboides*) *prognathus* und *Brachychalcinus longipinnis* (Popta) Steind.—*Anzeiger Kaiserlichen Akademie der Wissenschaften, Wien,* XLIV, 1907, 290–293.
Page 552. Line 17, for "Art" read art.
Page 552. Line 26, for "wahrend" read während.
Page 552. Line 28, for "Staate" read Staat.
Page 552. Line 39, for "*Myletes*" read *Myletes.*
Page 553. Line 2, for "lange" read Länge.
Page 553. Line 5, for "XXIV, 1909" read XLVI, 1909 (No. XXIV).
Page 553. Line 7, for "XXVI, 1909" read XLVI, 1909, 446–447.
Page 553. Line 15, for "äuszeren" read äusseren.
Page 554. After line 15 add:

—. Nouvelles Observation sur le Capitan de Bogota.—*Recueil d'Observations de Zoölogie et d'Anatomie Comparée,* II, 1833, 341.

Page 554. After line 20 add:

—. Eene nieuwe soort van siluroïde of welsachtigen visch van Brazilië enzÿne Levenswÿze, naar het Deensch van J. Reinhardt, 1858, pp. 14 pl.

[1] This is the date of the publication of the monograph. The date as given in the text is the date of the title page of the entire volume.

MEMOIRS

OF THE

CARNEGIE MUSEUM.

VOL. V. NO. 1

THE FRESHWATER FISHES OF BRITISH GUIANA, INCLUDING A STUDY OF THE ECOLOGICAL GROUPING OF SPECIES, AND THE RELATION OF THE FAUNA OF THE PLATEAU TO THAT OF THE LOWLANDS.

By C. H. Eigenmann, Ph.D.

INTRODUCTORY.

I had two purposes in view in the trip to Guiana: *first*, to observe, photograph, and incidentally collect as many species as possible for my monograph of the characins; *second*, in connection with my general faunal study of the fishes of South America to determine, if possible, the relation of the fish-fauna of the Guiana plateau to that of the lowlands, more particularly the relationship existing between the faunas of the upper and the lower Potaro. The two reaches of the Potaro are separated from each other by the Kaieteur Fall, over which the water leaves the Guiana Plateau by a drop of seven hundred and forty-one feet. Although all other things were sacrificed to the two purposes mentioned, I cannot claim that I accomplished them to my entire satisfaction. The conditions were all so novel, the difficulties of travel so great, the heat so intense, the fauna so rich, the time and the money at my command so limited, that I now occasionally regret that at this or that point I did not use different means, or devote more time to the objects in view. But to offset this regret I have many solid satisfactions.

If seeing and recording a lot of "specimens," which have been disintegrating for longer or shorter periods in alcohol, can be called acquaintance, I have been acquainted with South American fresh-water fishes for many years. In contrast

to such an acquaintance I recall standing one exciting morning on the brink of a small pool, which my Indians said contained fishes. It was not more than fifty feet across and was back-water left by the receding Essequibo. The Indians pounded poisonous hiari roots, tied them into bundles, and the boys then swam through the pool with them over their backs, and thus mixed in the poison. Soon one species, then another, and still others, which I had only known as mummies, were resurrected from the depths of that pool, and I danced about its margin with delight to see them in their vivid living colors and incidentally to embalm them in their turn for future reference. On another glorious working day, which lasted from 6 A.M. to 12:30 A.M. of the day following, I secured over seventy species of fresh-water fishes, more than forty of which were characins.

Robert Schomburgk noted eighty-three species of fishes in his travels about Guiana, only thirty of which came from the region covered by this paper. I secured more than twice as many species in a few hours. Richard Schomburgk reported a total number of one hundred and forty-eight species, of which about eighty were recorded from the area covered by this report. In all, only one hundred and sixteen species have been hitherto recorded from the rivers of British Guiana, discharging into the Atlantic, while three hundred and sixty species are recorded in the present paper. Of these I myself collected all but twenty-seven. Of the twenty-seven species I have examined all but *Rhamdia laukidi*, *Rhamdia arekaima*, and *Pimelodus altipinnis*. *Rhamdia laukidi* and *arekaima* are probably forms of *R. clarias*. No one has seen them since Schomburgk's day, and he did not preserve specimens. *Pimelodus altipinnis* was described from a small specimen said to have come from Demerara. The species said to be *P. altipinnis* is abundant in the lower Amazon.

With the exception of the few cases in which labels were lost in transit, all of the specimens here recorded are assigned to exact localities. Very few definite localities had been previously put on record. "Demerara," "Essequibo," "Rupununi," or "British Guiana," have been the usual designations. *Nannostomus beckfordi* Günther and *Heterogramma steindachneri* Regan are among the few species the definite habitats of which were known.

Science owes a debt to a number of persons in and out of Guiana, who very generously assisted me in various ways. The officers of the Quebec Steamship Co., Ltd., transported our collecting outfit and our collections free of all charge, and made generous reductions from the regular passenger tariff from New York to Georgetown and return. Messrs. Sprostons, Ltd., conveyed us and our baggage free to all points within the colony reached by their boats, and put

us under still greater obligations by instructing their various agents to help us in every possible way. The officers of the railway between Georgetown and New Amsterdam gave us similar help. Mr. Lyman Jones and Mr. St. Aubyne of the Lama Water Conservancy placed boats, a house, servants, and a number of men at our disposal, and the collections from Lama Stop-Off, Maduni Stop-Off, and Cane Grove Corner are altogether due to the disinterested help of these gentlemen. The most generous interest in the success of the expedition was displayed by Dr. Edwin Bovallius and Mr. George Linnell, who furnished me with boats and a crew of sixteen Indians, who conducted me from Kangaruma to the Chenepowo River at Holmia and to the Aruataima Cataract. Mr. William Grant, the Indian guide and interpreter on this trip, became an enthusiastic fisherman, and has sent me many new things since my return.[1] At Holmia the quarters of the Essequibo Exploration Company were placed at my disposal, and here I was able to recuperate from a fever, while my crew were gathering poison and fishes. The success in the upper Potaro is entirely due to the generous help of Messrs. Bovallius and Linnell. At Tumatumari Mr. Brummel, at Wismar Mr. J. D. Spence, and at Georgetown Messrs. J. B. Mitchell, James Rodway, C. W. Anderson, E. A. V. Abraham, and Professor J. G. Harrison aided me in various ways. Mr. B. S. Conrad of Georgetown, to whom I had a letter of introduction, greatly assisted the expedition with advice and guidance. He not only generously devoted much of his own valuable time to the interests of the expedition, but introduced me to other gentlemen, who aided me in a variety of ways. I am indebted to Mr. E. S. Shideler, who acted as volunteer student assistant on this trip. He collected with me most of the time, and the collections from Malali, Bartica, the Botanic Garden, and the northwest are entirely due to his efforts.

The summer of 1910 was devoted to examining the types of fishes from Guiana in European museums. Drs. G. A. Boulenger and C. T. Regan of the British Museum, Drs. Th. W. van Lidth de Jeude and C. M. L. Popta of the Leyden Museum, Director Dr. Max Weber of the Amsterdam Museum, Director Dr. A. Brauer and Dr. P. Pappenheim of the Royal Museum in Berlin, Intendant Hofrat Dr. Fr. Steindachner of the K. K. Naturhistorisches Hofmuseum in Vienna, and Dr. J. Pellegrin of the Musée d'Histoire Naturelle in Paris all cordially coöperated by placing the types in their keeping at my disposal.

[1] Mr. Grant collected in the following places not reached by me: Nickaparoo (or Nickaparu) Creek, branch of the Ireng; Maripicru, a branch of the Ireng between Wontyke and Karakara, above the Karona falls; Chipoo, a tributary of the Ireng between Karakara and the Rupununi; Papan, near Eworora; Twoca Pan, between the Rupununi and Pununike; Rupununi, opposite Massara Landing; creek between Rapoo and the lower falls; Packeoo should possibly be "Pacu" Falls, in the Rupununi; Gatuck Creek, Potaro Highland; Yakeatonuk Fall, Potaro River. Some of these names are spelled in several ways on the different labels.

Most of the drawings illustrating the paper were prepared by Mr. W. S. Atkinson of Stanford University. The photo-drawings are for the most part the combined work of Professor W. Cogshall of Indiana University, Miss Maud Siebenthal, and myself. The final arrangement of the figures on the plates was the work of the Editor, to whom I am indebted for much other kind help and crit cism.

In the preparation of the account of the *Ariinæ* I had the assistance of Mr. Owen Frazee. Mr. Elmer Deem assisted with the *Doradinæ*, and Miss Lola Vance with the *Pimelodinæ*. The account of the *Gymnotidæ* was prepared by Dr. Max Ellis. I have given no figures of the *Gymnotidæ*, having reserved these for the monograph of the family by Dr. Ellis, which is ready to go to press. The *Sciænidæ* were described by Mrs. Marian Durbin Ellis, and the accounts of *Hemigrammus* and *Hyphessobrycon* are extracted from the monograph of these genera by Mrs. Ellis, which is still in manuscript.

Mrs. Rosa Smith Eigenmann has been of the greatest assistance in the preparation of this paper. Deprived of the pleasures and responsibilities of more formal collaboration, she has critically read the manuscript and overseen the work of the artists.

CHAPTER I.

BRITISH GUIANA.

In speaking of the country I cannot do better than to reproduce in part the excellent account from the pen of Wilgress Anderson, F.R.G.S., contained in a work upon the goldfields published a couple of years ago by Mr. J. B. Harrison. The pages of the original are indicated in brackets:[2]

General Physical and Topographical Features of British Guiana.

[p. 9.] "*Situation and Extent.*—The region called Guiana, or Guyana, stretches along the northern coast of South America from the mouth of the Orinoco River to that of the Amazon River, and inwards to Brazil. . . .

"The only European possessions in South America are three in number, and are situated on the central portion of this territory, which is divided into the colonies of the British, Dutch, and French Guiana.

"Of these colonies, the most westerly is that of British Guiana, which extends from the eastern limits of Venezuela, westward to Dutch Guiana, and north of Brazil to the coast on the Atlantic Ocean, its extreme limits touching the parallels of 0° 41′ and 8° 33′ 22″ north latitude, and the meridians of 56° 20¼′ and 61° 23′ 24.7″ west longitude.

"British Guiana has a seaboard of about 270 miles trending in a southeasterly direction, with a mean depth of about 500 miles, and is equal in extent to the combined size of England, Scotland and Wales, the area being about 90,000 square miles, most of which is densly covered with exuberant primeval forest, but in some parts there are broad open flats and undulating grassy plains, or savannahs, and mountainous grass-clad country.

"*Physical Features. The Alluvial Belt.*—The colony may be divided broadly into two low-lying belts near the coast and a hilly and mountainous hinterland which constitutes by far the largest area.

"The coast-lands are flat and for the most part swampy, being slightly depressed below the level of ordinary spring-tides, so that sea-walls and other defences

[2] *The Geology of the Goldfields of British Guiana*, by J. B. Harrison, 8vo, pp. i–ix, 1–320, 13 plates. London, Dulau & Co.

have to be constructed to protect the settled parts of the coast-lands from being flooded by high tides. They form part of an alluvial belt which rises gradually from the sea-level and extends inland for a distance varying from ten to forty miles, and which is composed of variously colored clays with intermediate layers of sand and peat, the latter being locally known as pegass.

"The margins of this formation along the sea and rivers are covered with a dense growth, consisting principally of mangrove (*Rhizophora mangle*) and of courida (*Avicenna nitida*), which form natural sea-defences, the former being found along the western and the latter along the eastern parts. Behind this growth are flat grassy savannahs [p. 10] interspersed with forest, consisting mostly of Aeta and Trooli palms (*Mauritia flexuosa* and *Manicaria saccifera*), whilst in some parts the land is covered with a dense jungle. It is on this belt that all the sugar estates and by far the greater part of the cultivated areas are situated.

"*The Sand and Clay Belt.*—The alluvial belt is succeeded by a slightly elevated and undulating belt composed of sandy and clayey sedimentary soils, derived from the disintegration of the various country rocks *in situ*, and traversed in some places by sand-dunes, which rise from fifty to about one hundred and eighty feet above the sea-level. This second belt commences at the Waini River, in the north-western district, and gradually increases in width as it extends toward the eastern boundary of the Courantyne, in the vicinity of which it attains its greatest depth at about one hundred miles inland. Grass-covered downs occur on the banks of the Berbice and Courantyne Rivers, but the greater part of this tract consists of high forest, and along the river margins and in the valleys mora trees (*Dimorphandra mora*) grow plentifully.

"*The Hinterland.*—Beyond these belts, southward, the country rises between the river valleys, which are in many parts swampy, and as it approaches the sources of the larger rivers attains a height of about nine hundred feet above the sea-level at the source of the Takatu, the western boundary, and about four hundred feet above the sea at the source of the Courantyne, the eastern boundary. This more elevated portion occupies about eleven-twelfths of the area of the colony. It is diversified by numerous low hills and valleys, and contains three principal mountain ranges, several irregularly distributed smaller ranges, and in its southern and eastern parts many scattered isolated mountains, none of the last mentioned being more than fifteen hundred feet above sea-level.

"The eastern portion is almost entirely forest-clad, yet the country on the western side of the colony, between the Rupununi and Ireng Rivers and extending southwards from the Pakaraima Mountains to the Kanuku Range consists of an

almost flat grass-clad plain or savannah, elevated about three hundred feet above sea-level, in which, in the vicinity of and bordering upon the many streams by which it is watered, are patches of woodlands. From the Kanuku Mountains southwards to about six miles from the source of the Takutu and from that river eastwards to a considerable distance beyond the Rupununi there is an extensive and undulating elevated savannah with similar patches of woods along the valleys of the many streams by which it is drained. Beyond this the extreme southern part of the colony is entirely forest-clad.

[p. 11.] "*Rivers.*—Of the numerous river-systems there are six principal ones, viz.:—

(1) The Essequibo and its principal tributaries, the Mazaruni and Cuyuni;
(2) The Courantyne and its tributary, the New River;
(3) The Berbice and its tributary, the Canje;
(4) The Waini and its tributary, the Barama;
(5) The Demerara;
(6) The Barima.

"These, together with the following smaller ones, the Abary, Mahaicony, Mahaica, Boerasirie, Pomeroon, and Maruka Rivers, flow to the Atlantic Ocean.

"In addition to the above mentioned rivers, there are the Takatu and its tributary, the Ireng, which meet together at 3° 34′ north latitude and form the Brazilian boundary. The Takuta River flows thence to the Rio Negro, the waters of which join the Amazon.

"The Essequibo, the largest river in the colony, rises in 0° 41′ north latitude, about eight hundred and fifty feet above the sea-level and flows in a northerly direction for some six hundred miles. It is joined at Bartika, about forty miles from its mouth, by the Mazaruni River, a tributary, which is itself joined at Cartabo, five miles above Bartika, by another tributary called the Cuyuni River, all these combining to form an estuary with a width of about three miles below their junction, and which expands to a width of fourteen miles at the mouth, containing, as it approaches the sea, three islands, each of which is about twelve miles in length, and in addition many smaller ones. The river is navigable for large vessels as far as Bartika, and for small launches to the foot of the first rapids, eighteen miles above that point. Beyond this its course is broken by many rapids and cataracts, and about five miles above the junction of the Rupununi the Essequibo river is practically unnavigable on account of the many long series of cataracts and falls, which obstruct its course.

[p. 12.] "The Rupununi River joins the Essequibo in 4° 2′ 52″ north latitude,

and gives access during the rainy seasons to the elevated grass-clad plains, or savannahs, on which at the present time a large number of cattle are being raised. During the height of the dry seasons the river becomes very shallow, its course being impeded by many sandbanks and rapids, and during this time it can only be ascended with great difficulty and much loss of time, or rather not at all. Its many inlets and large lake-like ponds on both banks form a feature common also to the upper parts of the Berbice River. Its largest tributary is the Rewa, or Illiwa, which is itself joined by the Quitaro, and both flow through country covered with high forests."

[p. 14.] "The Demerara River, although commercially the most important and best known of all the rivers in the colony, is, compared with some of those already described, a small one. As the greater depth at the bar admits of large vessels entering this river with more security and ease than is the case with any of the other rivers in the colony, Georgetown, the capital and principal port of the colony, has been established on its east bank at its mouth, which is there three-quarters of a mile wide, and furnishes a safe harbor for the many steamers and sailing vessels which frequent the port. The Demerara River takes its rise in the small mountain-range called the Maccari, which is really an offshoot of the great Pakaraima range. It has a generally northerly course, and flows between the Essequibo and the Berbice Rivers. The river is navigable for steamers for nearly eighty miles upwards from its mouth, and beyond this for launches for about twenty-four miles further up, as far as the Malali Rapids, where the influence of the tide ceases. Above Malali the river is again navigable for launches as far as Kanaimapoo, above which are the Kumaparu Rapids, where the Demerara River approaches nearest in its course to the Essequibo River. The first great cataract on this river is situated a short distance above Kamaparu, in latitude 5° 18′ north, and is known as the Oruru-Malali, or Great Falls. Beyond Oruru-Malali the river is sluggish, and is again navigable for boats as far as the Cannister Cataracts, where it divides into two streams. Its forest-clad banks are flat as far up as the second or sand and clay belt, where the sand hills occur and form the first high land."

"*Mountain Ranges.*—One of the most prominent features of the country is the great central mass of mostly flat-topped mountains, known as the Pakaraima group or chain, which occupies the most western [p. 15] portion of the colony, and stretches southward from the Cuyuni River to within thirty miles above the mouth of the Ireng River, and eastward to the Essequibo River right across the colony as far as the Courantyne River."

"The bulk of these mountains forms a successive series of terraces and broad,

undulating plateaus, with bold, and in some cases, perpendicular sandstone escarpments, varying in height from about twelve hundred to over two thousand feet, and eventually forming a large undulating table-land at an average height of about thirty-five hundred feet above the sea-level. In many parts of the mountains and table-lands great and deep gorges have been eroded by the rivers and streams which traverse them. They attain their greatest height at Mount Roraima and Mount Kukenaam, both of which rise over eight thousand five hundred feet above the sea. The portion of this range which extends westward and down the southern bank of the Mazaruni River to the vicinity of the Teboco Cataracts retains the striking flat-topped features and is known as the Merumé Mountains."

"The elevated table-land (8635 feet) of Mount Roraima is about twelve square miles in area, and on it the boundaries of the colony with those of Venezuela and Brazil meet at a common point. This very remarkable mountain, together with Mount Kukenaam, is a part of one of the most extensive sandstone formations on the globe, and they both rise with perpendicular cliffs of sandstone two thousand feet in height above the base of the surrounding country."

"The highest plateaus, such as Mount Roraima, are mostly bare, exposed expanses of rock, between the crevices of which grow many rare and curious orchids and other flowering plants, besides some low bushes and extremely stunted trees."

General Geology.[3]

[p. 19.] "*The Coast-Lands.*—The alluvial deposits are of considerable, but unknown thickness. As they rest upon beds of pipe-clay or impure kaolin it is a matter of great difficulty to decide whether the borings for underground waters, which have from time to time been made in various parts of the coast-lands, have been wholly in the alluvium, or have, as they certainly have done in some cases, penetrated through these beds into the underlying residuary clays. In places, however, the alluvial deposits have been proved for depths of over two hundred feet, and it is possible that in many places their thickness far exceeds this. The cores of the borings show that the alluvial deposits consist of beds of more or less indurated marine muds and sands which have been laid down so as to form beds of clay, of mixed clay and very fine siliceous sand, locally known as 'caddy,' and of siliceous sands varying much in texture—some beds consisting of sand of extremely fine texture, others of coarser grain, while others again approach in character fine grits or gravels. In places some of the beds contain considerable quantities

[3] The notes upon the Geology are derived from the same work hitherto quoted, and from the pen of Mr. J. B. Harrison, the Government Geologist of British Guiana.

of decomposing vegetable debris, and these, when drilled into during deep well-sinking operations, in some cases give off inflammable mixtures of gases containing marsh gas in considerable quantities. In places the effusion of the gases has been accompanied by that of small quantities of petroleum, a decomposition product of the organic matters. The geological age of these beds is uncertain, *the lower parts may be of late Tertiary or Pleistocene age,* while the parts now bordering the coast-line are undoubtedly recent. I am inclined to think that their age is, in part at least, similar to that of the Moruga sands of Trinidad. The sand-beds of these deposits are not unfrequently exposed in the cultivated parts of the coast-land, where they are known as sand-reefs. These form in places oval patches of land raised a few feet above the general level of the surrounding [p. 20] argillaceous soils, and in many others gives rise to long narrow ridges somewhat raised above the general level of the land which they traverse. Their mode of occurrence indicates that they are purely local modifications of the alluvial deposits,—sands separated from the mass of the marine silt by the action of local currents and of the waves,—and thus the sand-beds form more or less lenticular beds occupying, as a rule, no great area. They are, in my opinion, very distinct from the beds of sand which characterize various phases in areas where the land is either rising or falling to any extent in the vicinity of a shallow sea.

"*The general evidence indicates that British Guiana occupies one of the most stable areas of the earth's surface,—one which has been very slowly rising through long ages,**—this slow movement having given rise to the low rapids which usually mark the termination of the tide-way in the rivers, and possibly which has so altered the contour of parts of the continent on which the colony is situated as to change the main lines of drainage, and thus to make the rivers relatively small streams traversing the deeper parts of the courses and valleys eroded by their predecessors in earlier periods. During a stage in this slow upheaval the low hills already mentioned as occurring in a few places in the alluvial coast-land were in turn rocks and small islands in the shallowing sea which then surrounded them, as now they are surrounded by an apparently unbounded expanse of forest or of marsh.

"A remarkable feature in parts of the alluvial coast-land is the occurrence of extensive beds of a kind of peat. This is locally known as 'pegass,' and consists of the more or less altered remains of ferns, mosses, and sedges, and of other marsh-loving plants. It resembles in its general character the upper layers of the vegetable matter which are found in peat-bogs in temperate climates. As far as my observa-

* The Italics are mine. *C. H. Eigenmann.*

tions go it is never as compact as true peat. This is probably due to the deposits of it being seldom more than from two to four feet in thickness.

"As pointed out by Sir Charles Lyell in his 'Principles of Geology,' a large portion of the sand and clays of the alluvial deposits has been brought by the currents from the mouth of the Amazon River; the burden brought by the present rivers of the colony from the higher districts through which they flow having been, during recent periods, a very subordinate factor in the accumulation of this widespread formation; although perhaps in earlier times, before the land had risen to its present level, the river-borne silt may have contributed a large quota to the mass.

"*The Forest Lands and Residuary Deposits.*—The alluvial strata extend to depths varying from five to, in places, as much as thirty-five miles from the coastline and rest upon beds described by C. B. Brown as 'sand and clay deposits.'"

[p. 21.] "These residual deposits cover and hide the true country over vast areas of the lower-lying parts of the colony, and form the characteristic sub-soils and soils of our forest regions.

"The parts of the areas covered by these residuary deposits which abut upon the true alluvial beds are in many places traversed by long ranges of sand-dunes, giving rise to low hills, which, as in the case of the range traversed by the Demerara-Essequibo Railway, may attain a height of somewhat over two hundred feet. As a rule, their heights do not exceed one hundred or one hundred and twenty feet. The sand, of which the upper parts, at any rate, of these dunes (it is possible that in many cases they cover ridges of the residuary deposits) consist, is glistening, white, quartz sand, the grains of which are usually uniform in size over relatively large areas, the majority being well rounded, thus accentuating the wind-blown origin of the dunes.

"C. B. Brown notices that the beds form a low escarpment at the southern limit of the fluvio-marine deposit, and that this has been taken for a ridge running parallel to the coast. I have not had opportunities of repeating this observation, but, accepting its accuracy, I consider that the ridge approximately marks the shoreline, which existed at the commencement of the deposit of the present fluvio-marine [p. 22] alluvium. Observations made in the forest regions since the time of Brown's geological reconnaissances of the interior of the colony have shown that the residuary deposits cover the country not alone on the plains of the lowlands, but along the great river-valleys and on the lower forest-covered parts of many of the hills and mountains. The heavy, at times torrential, tropical rains have carved out of the residuary coverings deep ravines and valleys; and the gravels, sands, and

silts derived from the eroded material have been laid down in the wide valleys along the courses of parts of the rivers as fluviatile loams, gravels, and sands.

"*The Sandstone and the Diabase Intrusions.*—Large areas of the interior of the colony are occupied by a thick stratified formation of sandstone and conglomerate. Just as the basal igneous rocks are, so is this, pierced and traversed by dykes of diabase, hence the latter rock must be of later origin than all except the sedimentary coverings and the fluvio-marine deposits. The blue-grey rock varies much in depth of color and texture, and its varieties will be described in the chapters dealing with the petrography of the colony.

"The diabase intrusions occur in belts, generally stretching across the colony in a north-westerly and south-easterly direction. The intrusions vary from narrow dykes, only exposed in the courses of the rivers during very dry seasons, some being not more than from two to three feet across, to low hills and to mountain ranges, some of which—for example, the Eagle mountains in the Potaro gold district—exceed in height two thousand feet. The tops and sides of the hills and mountains, except where they have suffered great denudation, are covered with ironstone gravel, while the lower parts of the district in which diabase forms the [p. 23] country are covered up with strata of laterite, frequently over one hundred feet in depth, and in places interspersed with nests of secondary quartz, or traversed by veins and stringers of quartz, or, less often, by lenticular layers of secondary quartz, closely resembling, when cut through by mining shafts, tunnels and trenches,—true quartz-reefs. The quartz rock in all these forms is not unfrequently auriferous, the metal being dispersed through it in a very irregular manner, especially in the large lenticular layers, which in many parts are nearly, or even entirely, barren of gold, and in others are "bonanzas" carrying at rates from twenty to, in places, several hundred ounces of the precious metal to the ton of the rock. Unfortunately hitherto these bonanzas have proved few and far between; but there is no reason for assuming that they will not be found in many places in the enormous area of the laterite deposits which up to the present has not been prospected, as they have been in similar places at intervals in the past. Gold also occurs as paint gold, as gold dust, and as nuggets of very varying sizes in the laterite.

"Of earlier age than the diabase is the sandstone and conglomerate series. It constitutes the greater portion of the Pacaraima mountains, and spreads westwardly into Venezuela. A similar formation occurs in Brazil, and in all probability is part of the same massif as the Guiana one. Wherever it occurs it appears to be unfossiliferous, and hence we have no paleontological evidence with regard to the geological period at which it was deposited. Two conjectures have been made

as to this. C. B. Brown arrived at the conclusion on what appears to me to be somewhat defective evidence (its, in parts, reddish color, its unfossiliferous nature, and its being penetrated by masses, dykes, and sills of greenstone—diabase—as are sandstones of Triassic age in North America), that it is an equivalent of the New Red sandstone. In Venezuela its relationship to rocks of known age is said to be recognizable, and it is stated to be of Cretaceous age. A like conclusion that the northern parts of the formation are of Cretaceous age has been arrived at in Brazil. If these views are correct, the later outbreaks of diabase, which are, directly or indirectly, the causation of many of the auriferous deposits of British Guiana, must be either of Cretaceous age, or belong to the Tertiary or to a later period. And as there is a very great resemblance in the magmatic character of the Guianan diabase, and of the lavas of the West Indian province, whose outbreaks are clearly of Tertiary and of present age, the assumption of the relatively recent age of the diabase is a plausible one. As will be mentioned in a later chapter, the diabase shows no signs of the effects of the regional metamorphism which has materially affected many of the rocks underlying the sandstone formation.

"The only evidence available in this colony with regard to the sandstone and the geological period of its formation is that wherever its base has been seen it occupies an analogous position to the Torridonian sandstones of the Scottish Highlands, to which the sandstone has a close resemblance in constitution. It lies invariably on the presumably Archean rocks of the colony; and its constituents, as far as I have been [p. 24] able to examine them, show no signs of having, even in part, been derived from later rocks. If it is of Cretaceous age it offers an interesting example of the recurrence of similar formations in widely divided geological ages, when the conditions affecting their formation and deposition are identical. Personally I am not prepared from my own observations and studies to accept any statements of its geological age further than that shown by its relationship to the underlying gneiss, porphyries, felsite and schists derived from them.

"The sandstone formation spreads eastwardly through the colony, crosses the Essequibo River in a low narrow belt at Comuti Mountain, gives rise to the Maccari Mountain in Demerara, and crossing the Berbice River near Marlissa Rapids, is seen forming a low mountain range at Itabru near that river. It passes into Dutch Guiana across the Courantyne River near its union with the Cabelebo River, and also in its higher reaches. The formation consists of beds of coarse conglomerate, red and white sandstones of very varying textures, and in places of strata of red shale.

"High mountains occur in the sandstone formation, which consist of coarse

textured diabase or of rather fine-grained gabbro. This rock shows signs of metamorphism, in places being granulitic in structure and in others being changed to a considerable extent, either by the development in it from augite of a dark-brown secondary biotite, or the pyroxene is altered from an almost colorless mineral to a brown-colored strongly dichroic one.

"Mr. C. Wilgress Anderson, who in 1895 spent several months in traversing the sandstone district while inquiring into the alleged occurrence of beds of auriferous conglomerate in it, and has since crossed it repeatedly during the Boundary Surveys, is of opinion that the diabase gabbro is of greater age than the sandstone, the latter formation in places resting on or abutting against it, and this view is upheld by its structure. The hills were probably small islands in the shallow seas in which the sandstone formation was laid down. C. B. Brown, on page 14 of the 'Reports on the Geology of British Guiana,' mentions the occurrence of great layers of conglomerate in the neighborhood of 'greenstone,' and this is confirmatory of Mr. Anderson's view. The possible existence of 'greenstone' of two distinct geological ages and modes of occurrence does not seem to have struck Brown and Sawkins, but it offers an intelligible explanation of the facts recorded by them in their reports. These surveyors estimated the total thickness of the sandstone on the assumption that it is traversed by three layers of greenstone at about three thousand feet. As, however, it is probable that some at least of the latter diabase, as, for instance, that at Roraima, is in the form of laccolites, and during intrusion has elevated great tracts of the sandstone country, probably the formation has not the total thickness deducible from C. B. Brown's figures, and may at present not anywhere exceed in thickness that shown at Roraima—about two thousand feet. As a rule the sandstone lies nearly horizontally, dipping somewhat to the north, and few faults are seen in it, although in places near where diabase has intruded into it [p. 25] there are well-marked local disturbances in its dip. Many of the beds of sandstone of finer texture show well-marked current-bedding."

CHAPTER II.

EARLIER WORKS ON THE FISHES OF BRITISH GUIANA.

The first notice of the fishes of the area covered by this report, which I have been able to discover, is Van der Lott's "Kort Bericht von den Congeraal, ofte Drilvisch," Verhandl. Holl. Maatsch., Harlem, 1762. Van der Lott was at the time a surgeon on the Essequibo, who attributed so many "medical properties" to the electric eel that he "acquired no increase in reputation therefrom in this colony," as Bancroft says.

In his "An Essay on the Natural History of Guiana," London, 1769, Edward Bancroft publishes a letter dated "Demerary, Aug. 15, 1766," in which he mentions or describes (p. 188) the "*Lowlow*," the "*Barroketa*" (Arapaima?), (p. 189) "*Peri*" (Serrasalmo?), (p. 190) "Saw-fish, Flounders, *Brasilian* Soles, *Surinam* Mackarel, Drummers, Old-wifes, Mullets, and a species of Anchovies."

He devotes several pages, 190–202, to the "torporific eel," attributing the shock to electricity. This was several years before Holst (1772) demonstrated that the peculiar power of the torpedo is due to electricity.

Hillhouse in his "Indian Notices," a book which I have not seen, is said to enumerate "twenty-six species as peculiar to the coast, estuaries, and rivers of Guiana."

Hancock in his "Notes on some species of Fishes and Reptiles from Demerara, presented to the Zoological Society by John Hancock" (Zoological Journal, Vol. IV, pp. 240–247, 1829; also *Isis*) describes:

Doras costatus	= *Doras hancockii* Cuv. & Val.
Callichthys littoralis	= *Hoplosternum littorale* (Hancock).
Hypostomus watwata	= *Plecostomus watwata* (Hancock).
Hypostomus multiradiatus	= *Pterygoplichthys multiradiatus* (Hancock).
Loricaria brunnea	= *Loricariichthys brunneus* (Hancock).

But the first real work in gathering fishes and knowledge concerning them began with the explorations of Robert Hermann Schomburgk, conducted during the years 1835–1839 under the auspices of the Royal Geographical Society and the British Government. The explorations were continued by Robert Hermann

Schomburgk and his brother, Richard Schomburgk, during the years 1840–1844. Robert in the second expedition went as an explorer for the British Government. Richard Schomburgk was sent along by the king of Prussia at the instigation of Alexander Von Humboldt.

Robert H. Schomburgk during his first expedition collected but few specimens, to which we may now refer. But he had many drawings made and furnished notes concerning the species drawn. The notes were edited, the drawings named, and the whole published by Jardine as "Fishes of British Guiana," Parts I and II, forming Volumes XXXIX and XL of "The Naturalists Library."

Schomburgk not only explored the rivers flowing northward, but made a long tour across the head of the Orinoco, down the Rio Negro, and up the Rio Branco. Fifty-three of the eighty-three species noted in the volumes seem to have come from the basin of the Rio Negro, only thirty being definitely ascribed to streams flowing northward.

I long ago expressed the opinion that some of the drawings are composites, and that in some cases a wrong combination of figure and description was made by the editor.[4] Nevertheless the two little volumes form a notable contribution to the knowledge of the fishes of Guiana. Schomburgk presented to the Jardin des Plantes and to the British Museum several specimens, which were made the types of new species. Whether they were collected during his first or second expedition I do not know.

Schomburgk's first journey was described in his "Reisen in Guiana und am Orinoco während der Jahre 1835–1839," published by O. A. Schomburgk, Leipzig, 1841. The journey was divided into several longer or shorter excursions.

1. He left Georgetown September 21, 1835, and ascended the Essequibo to the Cuyuni, up which he went a short distance, and then continued on up the Essequibo to the Rupununi and up this river to near its source. He then returned to the Essequibo and went up this stream to the William IVth Cataract, then down to the Siparuni, up which he went some distance, returning March 28, 1836, to Georgetown.

2. On September 2, 1836, he again left Georgetown and ascended the Courantyne to some large cataracts.

3. On November 25th he started up the Berbice River and went to the parallel

[4] Schomburgk's difficulties may be appreciated from his statements, Vol. I, 82–83: "But with the exception of my Indian friends and Dr. Fleming's Philosophy of Natural History I had nothing to guide me in my researches" and "The first specimen of any fish, a drawing of which we did not previously possess, served generally to sketch its outward forms and general colors on the paper; and when we were fortunate enough to secure a second specimen those delicate hues were painted in, which are only visible immediately after the fish comes out of the water."

of the junction of the Rupununi and Essequibo and started over to the Essequibo and returned by way of the Berbice.

4. On September 12, 1837, he again ascended the Essequibo and Rupununi to the Rewa, up which he went and crossed over to the Cuyuwini, an upper tributary of the Essequibo. He descended it to the Essequibo, which he ascended to its source. He then returned to the Rupununi about Lake Amucu,[5] whence he went to Fort St. Joaquin on the Takutu. He left this place on September 20, 1838, sailing up the Takutu to its tributary, the Mahu, swinging from here northwestward to Roraima, thence southwestward to the Parima, up this river, and then, following the mountains, to Esmeralda on the Orinoco, along the Cassiquiare to the Rio Negro, down this river to the Rio Branco, and up this stream back to Fort San Joaquin on April 22d. He returned thence to Georgetown on June 20, 1839.

The species he figured and noted, together with the identification of those dealt with in the present work, are given in the following list. Those from the northern slope are marked with an asterisk; those which have been found on the northern slope since Schomburgk's day are marked †.

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	1. *Acanthicus histrix* Spix, p. 131, pl. 1.	Rio Branco at Fort San Joaquin.
†	2. *Loricaria cataphracta* Linnæus, p. 136.	Locality? = *Loricaria cataphracta* (Linnæus).
	3. *Hypostoma plecostomus* Valenciennes, p. 139.	Rio Branco, 8 in. = *Plecostomus plecostomus* (Linnæus).
*	4. *Hypostoma squalinum* Schomburgk, p. 142, pl. 2.	Rio Branco, Rio Negro, Essequibo. 13¼ in. = *Plecostomus emarginatus* (Cuv. & Val.).
	5. *Hypostoma punctatum* Schomburgk, p. 145, figure.	Rio Branco. 6½ in.
	6. *Hypostoma barbatus* Cuv. & Val., p. 147.	Loc ? 6¼ in. = *Pseudancistrus barbatus* (Cuv. & Val.).
*	7. *Callichthys longifilis* Cuv. & Val., p. 150, figure.	Pools, marshes, and creeks. 8 in. = *Hoplosternum thoracatum* (Cuv. & Val.).
*	8. *Callichthys* ? p. 152, figure.	Curassarraka on the Rupununi.
†	9. *Doras costatus* Lacépède, p. 155.	12 in. = *Doras costatus* (Linnæus).
†	10. *Doras cataphractus* Linnæus, p. 158.	Rio Negro. = *Doras cataphractus* (Linnæus).
	11. *Doras castaneo-ventris* Schomburgk, p. 161, pl. 3.	Pasawiri. 7 in. = ? *Doras cataphractus* (Linnæus).
*	12. *Doras brunnescens* Schomburgk, p. 163.	Upper Essequibo. 5 in. = ? *Doras cataphractus* (Linnæus).
	13. *Doras niger* Valenciennes, p. 165.	Esmeralda. = *Oxydoras niger* (Val.).
	14. *Doras*, p. 166.	Orooporary on the Essequibo.

[5] In recent works this word is spelled *Amacu*.

*15. *Phractocephalus hemilopterus* Agassiz, p. 169, figure.	All rivers of Guiana. 4 ft. = *Phractocephalus hemiliopterus* (Bloch & Schneider).
16. *Arius oncina* Schomburgk, p. 173, pl. 4.	Rio Padauiri. 10 in. = ?
17. *Arius obesus* Schomburgk, p. 174.	Rio Branco. 8 in. = ?
*18. *Pimelodus (Bagrus) maculatus* Lacépède, p. 175, figure.	Most of the rivers. 12 in. = *Pimelodus elarias* (Bloch).
*19. ? ? ? p. 176.	Demerara and Essequibo. 18–20 in.
*20. *Pimelodus arekaima* Schomburgk, p. 178, pl. 5.	Upper Essequibo and Rio Branco. 2 ft. 3 in. = *Rhamdia arekaima* (Schomburgk).
†21. *Pimelodus insignis* Schomburgk, p. 180, pl. 6.	Rio Branco. 18 in. = *Pimelodella cristata* (Müller & Troschel).
22. *Pimelodus notatus* Schomburgk, p. 181, pl. 7.	Rio Branco. 3 feet.
*23 *Pimelodus pirinampu* Spix, p. 183.	Rivers of Guiana. 3 feet or more. = *Piniram-pus pirinampu* (Spix).
24. *Platystoma tigrinum* Valenciennes, p. 185, pl. 8.	Most rivers of Guiana. = *Pseudoplatystoma fas-ciatum* (Linnæus).
25. *Platystoma planiceps* Agassiz, p. 187.	Rio Branco.
26. *Platystoma vaillanti* Valenciennes,[6] p. 188.	Guiana. To 2 ft. 3 in. = *Brachyplatystoma vaillanti* Valenciennes.
27. *Hyporhthalmus dawalla* Schomburgk, p. 191, pl. 9.	Rivers of Guiana. 2½ ft. = *Ageneiosus brevifilis* (Cuv. & Val.).
*28. *Lau-Lau*, p. 193, figure.	Rivers of Guiana. 10–12 ft. 200 lbs. = *Platy-stoma vaillanti* Valenciennes.
*29. *Sudis gigas* Cuvier, p. 198, pl. 17.	Rupununi, Rio Branco, Rio Negro. 15 ft. 410 pounds = *Arapaima gigas* (Cuvier).
*30. *Osteoglossum arowana* Schomburgk, p. 205, pl. 10.	Rupununi, Essequibo, Rio Branco, Rio Negro. = *Osteoglossum bicirrhosum* Vandelli.
31. *Chaleeus rotundatus* Schomburgk, p. 209, figure.	Padauiri. 6–7 in = *Chaleinus rotundatus* (Schom-burgk).
*32. *Chalceus tæniatus* Schomburgk, p. 210.	Essequibo, Rio Negro, Rio Branco. 15–18 in. = ?
33. *Chalceus labrosus* Schomburgk, p. 212, pl. 13.	Rio Paduiri.[7] 5¼ in. = ? *Brycon falcatus* Müller & Troschel.
*34. *Chalceus nigrotæniatus* Schomburgk, p. 213, pl. 13.	Loc. ? 14–16 in. = *Leporinus nigrotæniatus* (Schomburgk).
35. *Chalceus latus* Schomburgk, p. 214.	Padauiri, tributary of the Rio Negro. 4 in.
36. *Chalceus fasciatus* Schomburgk, p. 215.	Padauiri. 18 in.
*37. *Chalceus macrolepidotus* Cuvier, p. 216, pl. 14.	Essequibo. 15 in. = *Chalceus macrolepidotus* Cuvier.

[6] This species is given on the authority of Valenciennes. Its identity with the Lau-lau was not appreciated by Schomburgk.

[7] Padauiri?

†38.	*Anodus notatus* Schomburgk, p. 218, pl. 15.	Rio Negro. = *Anisitsia notatus* (Schomburgk).
†39.	*Serrasalmo piranha* Spix, p. 221, pl. 16.	Rio Branco. 10–11 in. = *Pygocentrus piraya* (Cuvier).
*40.	*Serrasalmo stagnatilis* Schomburgk, p. 222.	Upper Essequibo, in pools. 8 in. = ?
?41.	*Serrasalmo punctatus* Schomburgk, p. 223, pl. 17.	= *Pygopristis denticulatus* (Cuvier).
?42.	*Serrasalmo* ? p. 224.	
*43.	*Serrasalmo niger* Schomburgk, p. 225, pl. 18.	All rivers of Guiana. 16 in. = *Pygocentrus niger* (Schomburgk).
?44.	*Salmo emarginatus* Schomburgk, p. 231, pl. 19.	Loc. ? = *Metynnis* sp.?
45.	*Salmo undulatus* Schomburgk, p. 232, figure.	Padauiri. 6 in. = ?
46.	*Serrasalmo seotopterus* Schomburgk, p. 233.	Rio Branco.
*47.	*Myletes pacu* Schomburgk, p. 236 pls. 20 & 21.	Dikes of Essequibo. 24 in. = *Myleus pacu* (Schomburgk).
47a, b, c.	*Morocoto,*[8] *cartabac, palometo,* pp. 239, 240.	
*48.	*Tetragonopterus latus* Schomburgk, p. 241.	All rivers of Guiana. = ?*Metynnis*, sp.?
49.	*Tetragonopterus schomburgkii* Jardine, p. 243, pl. 22.	Rio Negro.
*50.	*Xiphostoma oeellatum* Schomburgk, p. 245, pl. 23.	Essequibo, Rios Negro and Branco. 2 ft. = *Hydrocynus cuvieri* (Agassiz).

[8] "The *morocoto, cartabac,* and a species of *pacu* which we found in the river Parama, and which differed only from the common pacu in its colour being black, constitute a group of fishes which resemble each other by structure, teeth, habits, and their being phytivorous. One of the most delicious among this division is the *morocoto* or *osibu* of the Warraus; it inhabits only the estuaries, and does not occur in fresh water; it would fall, therefore out of the limits of the present descriptions; but as it is so closely allied with the pacu, I shall mention at least its dimensions and general appearance. The teeth, which consist of fourteen in the upper jaw, and are placed in a double row in the fore part, are all distinctly molar or grinding teeth. It attains a length from about twenty-five to twenty-eight inches, and is twelve inches in depth. The gill covers consist of three strong bones, the dorsal fin of sixteen rays, the ventral of eight, and the anal of twenty-four, the caudal is compressed and thin; in every other respect it resembles the pacu, and is extremely fat and delicious. During the month of August, when they feed upon the fruit of the *caramacata,* a tree of large size and very hard wood, and the bark, leaves, and fruit of which is extremely bitter, their flesh has a bitter taste, but otherwise it is much sought after, and large numbers of it are occasionally brought from the mouth of the Orinoco to Georgetown. It forms the chief support of the Warrau Indians who inhabit the coast regions in the vicinity of the estuaries of the Orinoco and the months of the Guainia and Barima."

"The *palometo,* which is about fourteen inches long and seven inches in depth, its body compressed and flat, with a thin sharp belly, is equally well flavoured as the morocoto and pacu, and frequents similar haunts as the morocoto." (Fishes of British Guiana, pp. 239–40.) I have not identified these species which are mentioned only by their Indian names.

*51.	*Hydrocyon microlepis* Schomburgk, p. 247, pl. 24.	Essequibo, Rios Negro and Branco. = *Acestrorhynchus microlepis* (Schomburgk).
*52.	*Hydrocyon armatus* Schomburgk, p. 249, pl. 25.	All rivers of Guiana. 10–12 lbs. = *Acestrorhynchus falcirostris* (Cuvier).
53.	*Schizodon fasciatus* Spix, p. 252, pl. 26.	Rio Branco. = *Schizodon fasciatus* Spix.
*54.	*Erythrinus macrodon* Schomburgk, *non* Agassiz, p. 254, pl. 27.	Berbice, beyond the cataract, Itabru, Cuyuni. 4 ft. = *Hoplias macrophthalmus* Pellegrin.
*55.	*Huri, Cauhui, Tari-ira*,[9] p. 256.	In every river of Guiana. = *Hoplias malabaricus* (Bloch).
*56.	*Prochilodus rubrotæniatus* Schomburgk, p. 258, pl. 28.	Essequibo, Rios Branco and Negro. 2 lbs. = *Prochilodus rubrotæniatus* Schomburgk.
57.	*Prochilodus binotatus* Schomburgk, p. 260, pl. 29.	Rio Branco. 13½ in.
58.	*Prochilodus insignis* Schomburgk, p. 261, pl. 30.	Rio Branco. 11½ in.

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59.	*Belone guianensis* Schomburgk, p. 131, pl. 1.	Padauiri. 15 in. = *Potamorhaphis guianensis* (Schomburgk).
*60.	*Sciæna rubella* Schomburgk, p. 133.	Most rivers. 2 feet. = *Plagioscion squamosissimus* Heckel.
*61.	*Corvina grunniens* Schomburgk, p. 136, pl. 2.	Essequibo. = *Pachypops grunniens* (Schomburgk).
*62.	*Cychla labrina* Agassiz, p. 139, pl. 3.	Upper and lower courses. 6–7 inches. = *Crenicichla saxatilis* (Linnæus).
63.	*Cychla fasciata* Schomburgk, pl. 141, p. 4.	Loc.? = *Crenicichla johanna* Heckel.
64.	*Cychla rutilans* Schomburgk, p. 142, pl. 5.	Rio Branco. = *Crenichla lugubris* Heckel.
65.	*Cychla flavomaculata* Schomburgk, p. 145, pl. 6.	Rio Negro and Padauiri. 2 ft. = *Cichla ocellaris* (Bloch & Schn.).
66.	*Cychla nigro-maculata* Schomburgk, p. 147, pl. 7.	Rio Negro and Padauiri. 18 nches. = *Cichla ocellaris* (Bloch & Schn.).
*67.	*Cychla argus* Valenciennes, p. 149, pl. 8.	Essequibo; Rio Branco; Rio Negro. = *Cichla ocellaris* (Bloch & Schn.).
68.	*Cychla trifasciatus* Schomburgk, p. 151, pl. 9.	Rio Negro; Padauiri. = *Cichla ocellaris* (Bloch & Schn.).
69.	*Cychla ? rubro-ocellatus* Schomburgk, p. 153, pl. 10.	Rio Negro. = ?
70.	*Centrarchus cychla* Schomburgk, p. 157, pl. 11.	Rio Negro. = ?
71.	*Centrarchus niger* Schomburgk, p. 159, pl. 12.	Rio Negro. 6¾. = ?
72.	*Centrarchus notatus* Schomburgk, p. 160, pl. 13.	Loc.? = *Cichlasoma severum* (Heckel).

[9] This species is not listed under its scientific name.

73.	*Centrarchus ? vittatus* Schomburgk, p. 161, pl. 14.	Loc.? = ?
74.	*Centrarchus ?? rostratus* Schomburgk, p. 163, pl. 15.	Rio Negro. 4.4 inches. = *Acaropsis nassa* (Heckel).
*75.	*Centrarchus ? cyanopterus* Schomburgk, p. 165, pl. 16.	Essequibo. 3 in. = ? *Cichlasoma bimaculatum* (Linnæus).
76.	*Pomotis ? fasciatus* Schomburgk, p. 169, pl. 17.	Rios Padauiri and Negro. 8.5 in.
*77.	*Pomotis ? bono* Schomburgk, p. 171, pl. 18.	All rivers, and in pools and marshes. 6.5 in. = *Æquidens tetramerus* (Heckel).
78.	*Gymnotus electricus* Linnæus, p. 173, pl. 18.	Rio Negro. = *Electrophorus electricus* (Linnæus).
79.	*Gymnotus fasciatus* Pallas, p. 174, pl. 19.	Rio Branco. = *Gymnotus carapo* Linnæus.
80.	*Trigon histrix ?* D'Orbigny, p. 180, pl. 20.	River Roowa. 12 inches. = *Potamotrygon hystrix* (Müller & Henle).
81.	*Trygon garrapa* Schomburgk, p. 182, pl. 21.	Rio Branco. = *Potamotrygon hystrix* (Müller & Henle).
82.	*Trygon strongylopterus* Schomburgk, p. 183, pl. 22.	Rio Branco. = *Paratrygon strongylopterus* (Schomburgk).
83.	*Elipesurus spinicauda* Schomburgk, p. 184, pl. 23.	Rio Branco.
84.	*Silurus parkeri* Trail, p. 188, pl. 24.	= *Sciadeichthys parkeri* (Trail).

The brother, Richard Schomburgk, in the expeditions which have been mentioned, ascended the Demerara River to near the "Great Fall," He also threaded the Pomeroon, Waini, and Barima Rivers, which discharge their waters west of the Essequibo. He ascended the Essequibo to the Rupununi, following the latter to near its sources. From Pirara he ascended the Takutu to its source and descended it to Fort San Joaquin, whence he went to Roraima. His last collections, made on the trip to Roraima, were all lost.

An account of his journeys was published in two volumes under the title "Reisen in British Guiana in den Jahren 1840–1844 im Auftrag Sr. Majestät des Königs von Preussen." His collections were enumerated in a third volume. The new fishes were largely described in the "Horæ Ichthyologicæ," by Müller & Troschel, who also prepared the account of the fishes in this third volume. He gives many notes on the habits of the fishes in the first two volumes. Müller & Troschel enumerate one hundred and forty-one species as represented in his collections.[10] Most of these I had an opportunity of examining in the Zoological Museum in

[10] To these Schomburgk adds ten species known to him, but not recognized by Müller and Troschel. Some of these, like *Myletes pacu*, as Schomburgk himself noted, were given by Müller & Troschel under other names.

Berlin during July of 1910. On account of lack of time no effort was made to verify the marine or estuarine species. The list of species with the identification of those dealt with in the present volume is given in the following table.

1. *Centropomus undecimalis* Cuvier & Valenciennes, p. 620.	Coast. 1–2 ft. = *Centropomus undecimalis* (Bloch).
2. *Serranus galeus* Müller & Troschel, p. 621.	Coast.
3. *Pomotis catesbei* Cuvier & Valenciennes, p. 621.	
4. *Otolithus toe-toe* Cuvier & Valenciennes, p. 621.	Coast. 8–10 in. = *Cynoscion acoupa* (Lacépède).
5. *Otolithus leiarchus* Cuvier & Valenciennes, p. 621.	Coast. 12–14 in.
6. *Ancylodon jaculidens* Cuvier & Valenciennes, p. 621.	Coast. 6–8 in. = *Macrodon ancylodon* (Bloch & Schneider).
7. *Micropogon lineatus* Cuvier & Valenciennes, p. 621.	Coast. 1–2 ft. = *Micropogon furnieri* (Desmarest).
8. *Micropogon trifilis* Müller & Troschel, p. 622.	Coast. 16–18 in. = *Pachypops furcræus* Lacépède.
9. *Polycentrus schomburgkii* Müller & Troschel, p. 622.	Essequibo. = *Polycentrus schomburgkii* Eigenmann.
10. *Gerres rhombeus* Cuvier & Valenciennes, p. 622.	Coast. 10–12 in.
11. *Acharnes speciosus* Müller & Troschel, p. 622.	Mouth of Essequibo. 6–8 in. = *Cichla ocellaris* Bloch & Schneider.
12. *Chorinemus saliens* Cuvier & Valenciennes, p. 623.	Coast. 2–6 ft.
13. *Caranx carangus* Cuvier & Valenciennes, p. 623.	Coast. 2–6 ft.
14. *Mugil liza* Cuvier & Valenciennes, p. 623.	Mouths of rivers. 18–20 in.
15. *Mugil curema* Cuvier & Valenciennes, p. 623.	Mouths of rivers. 16–18 in.
16. *Gobius bacalaus* Cuvier & Valenciennes, p. 623.	Coast.
17. *Eleotris guavina* Cuvier & Valenciennes, p. 623.	Mouths of rivers. 8–10 in. = *Guavina guavina* (Cuvier & Valenciennes).
18. *Batrachus surinamensis* Bloch & Schneider, p. 623.	Coast. 8–10 in.
19. *Monochir maculipinnis* Agassiz, p. 624.	Coast. 20–26 in.
20. *Acara margarita* Heckel, p. 624.	Amucu Swamps. 8–10 in. = *Cichlasoma bimaculata* (Linnæus).
21. *Acara nassa* Heckel, p. 624.	Lake Tapacuma. 4–6 in. = *Acaropsis nassa* Heckel.

22. *Acara tetramerus* Heckel, p. 624.	Lakes Tapacuma, Capoye, and Amucu. 4–6 in. = *Æquidens tetramerus* (Heckel).
23. *Acara heckelii* Müller & Troschel, p. 624.	Swamps and savannahs. 4–6 in. = *Acarichthys heckelii* (Müller & Troschel).
24. *Chætobranchus flavescens* Heckel, p. 625.	Amucu. 6–8 in. = *Chætobranchus flavescens* Heckel.
25. *Geophagus jurupari* Heckel, p. 625.	Amucu, swamps and savannahs. 8–10 in. = *Geophagus jurupari* Heckel.
26. *Geophagus surinamensis* Müller & Troschel, p. 625.	Lakes Tapacuma, Capoye, and Amucu. 4–6 in. = *Geophagus surinamensis* Müller & Troschel.
27. *Geophagus leucostictus* Müller & Troschel, p. 625.	Amucu. 4–6 in. = *Geophagus jurupari* Heckel.
28. *Geophagus pappaterra* Heckel, p. 625.	Amucu (Tributary of Branco). 4 in. = *Geophagus jurupari* Heckel.
29. *Cichla ocellaris* Bloch & Schneider, p. 625.	All rivers. 2½ ft. = *Cichla ocellaris* Bloch & Schneider.
30. *Crenicichla saxatilis* Heckel, p. 626.	All rivers. = *Crenicichla saxatilis* Heckel.
31. *Crenicichla vittata* Heckel, p. 626.	Essequibo, Lakes Tapacuma and Capoye. = *Crenicichla lugubris* Heckel.
32. *Crenicichla lugubris* Heckel, p. 626.	Essequibo and neighboring swamps. = *Crenicichla lugubris* Heckel.
33. *Tylosurus guianensis* Müller & Troschel, p. 626.	Coast. 1–2 ft. = *Tylosurus almeida* Quoy & Gaimard.
34. *Bagrus mesops* Cuvier & Valenciennes, p. 627.	Waini and Barima. 2 ft. = *Selenaspis herzbergii* (Bloch).
35. *Bagrus proöps* Valenciennes, p. 627.	Waini and Barima. 18–20 in. = *Sciadeichthys proöps* (Cuvier & Valenciennes).
36. *Bagrus passany* Valenciennes, p. 627.	= *Selenaspis passany* (Cuvier & Valenciennes).
37. *Bagrus clarias* Müller & Troschel, p. 627.	Waini & Barima. 12–14 in. = *Pimelodus clarias* (Bloch).
38. *Bagrus caelestinus* Müller & Troschel, 627.	Waini & Barima. = *Selenaspis herzbergii* (Bloch).
39. *Bagrus emphysetus* Müller & Troschel, p. 627.	Waini and Barima. = *Sciadeichthys emphysetus* (Müller & Troschel).
40. *Platystoma tigrinum* Valenciennes, p. 627.	Nearly all rivers. 2½ ft. = *Pseudoplatystoma fasciatum* (Linnæus).
41. *Platystoma platyrhynchus* Valenciennes, p. 628.	Rupununi. = *Hemisorubim platyrhyncos* Cuvier & Valenciennes.
42. *Galeichthys granovii* Valenciennes, p. 628.	Waini and Barima. = *Felichthys bagre* (Linnæus).
43. *Pimelodus sebæ* Valenciennes, p. 628.	All rivers. 8–10 in. = *Rhamdia sebæ* (Cuvier & Valenciennes).
44. *Pimelodus raninus* Valenciennes, p. 628.	All rivers. 6–8 in. = *Pseudopimelodus villosus* Eigenmann.

45. *Pimelodus cristatus* Muller & Troschel, p. 628.	Takutu and Mahu. 16–18 in. = *Pimodella cristata* (Müller & Troschel).
46. *Pimelodus foina* Müller & Troschel, p. 628.	Takutu. 7–8 in. = *Rhamdella foina* (Müller & Troschel.
47. *Pimelodus eques* Müller & Troschel, p. 628.	All rivers. 16–18 in. = *Gældiella eques* (Müller & Troschel).
48. *Pimelodus stegelichii* Müller & Troschel, p. 628.	Forest brooks. 10–12 in. = *Rhamdia sebæ* Cuvier & Valenciennes).
49. *Calophysus macropterus* Müller & Troschel, p. 629.	Essequibo. 12 in. = *Callophysus macropterus* (Lichtenstein).
50. *Auchenipterus maculosus* Valenciennes, p. 629.	Essequibo. 4–6 in. = *Trachycorystes galeatus* (Linnæus).
51. *Auchenipterus furcatus* Valenciennes, p. 692.	Essequibo. 6–8 in. = *Pseudauchenipterus nodosus* (Bloch).
52. *Doras armatulus* Valenciennes, p. 629.	Rupununi and Awaricuru. 10 in. = *Doras costatus* (Linnæus).
53. *Doras niger* Valenciennes, p. 629.	All rivers. 10–12 in. = *Oxydoras niger* (Valenciennes).
54. *Doras carinatus* Valenciennes, p. 629.	Essequibo. 10–12 in. = *Hemidoras carinatus* (Linnæus).
55. *Doras maculatus* Valenciennes, p. 629.	Essequibo. 2 ft. = *Doras granulosus* (Valenciennes).
56. *Callichthys cælatus* Cuvier & Valenciennes, p. 630.	Trenches. 4–6 in. = *Callichthys callichthys* (Linnæus).
57. *Callichthys exaratus* Müller & Troschel, p. 630.	Trenches. 4–6 in. = *Hoplosternum thoracatum* (Cuvier & Valenciennes).
58. *Callichthys pictus* Müller & Troschel, p. 630.	Trenches. 4–6 in. = *Hoplosternum thoracatum* (Cuvier & Valenciennes).
59. *Aspredo lævis* Valenciennes, p. 630.	Waini. = *Aspredo aspredo* (Linnæus).
60. *Aspredo tibicen* Temminck, p. 630.	Coast. 10–12 in. = *Aspredinichthys tibicen* (Temminck).
61. *Acanthicus hystrix* Spix, p. 630.	Takutu and Rio Branco. 3–½ ft. = *Acanthicus hystrix* Spix.
62. *Loricaria cataphraeta* Linnæus, p. 631.	Rupununi. 8–10 in. = *Loricaria cataphracta* Linnæus.
63. *Loricaria acuta* Valenciennes, p. 631.	Rupununi. 8–10 in. = *Loricariichthys microdon* Eigenmann.
64. *Loricaria platyura* Müller & Troschel, 631.	Rupununi. 8 in. = *Loricariichthys platyura* (Müller & Troschel).
65. *Hypostomus commersonii* Valenciennes, p. 631.	Takutu. 6–8 in. = *Plecostomus verres* (Cuvier & Valenciennes).
66. *Hypostomus itacua* Valenciennes, p. 631.	Takutu. 3–4. = *Hemiancistrus braueri* Eigenmann.

67. *Hypostomus temminckii* Valenciennes, p. 631.	Takutu. 2–3 in. = *Ancistrus temminckii* Cuvier & Valenciennes.
68. *Hypostomus nudiceps* Müller & Troschel, p. 631.	Takutu. 2–3 in. = *Xenocara gymnorhynchus* (Kner).
69. *Anableps tetrophthalmus* Bloch, p. 632.	Mouths of streams. 6–8 in. = *Anableps anableps* (Linnæus).
70. *Anableps microlepis* Müller & Troschel, p. 632.	Mouths of streams. 4–6 in. = *Anableps microlepis* Müller & Troschel.
71. *Pœcilia vivipara* Bloch & Schneider, p. 632.	Georgetown canals and others. ½ in. = *Pœcilia vivipara* Bloch & Schneider.
72. *Erythrinus unitæniatus* Spix, p. 632.	Swamps, streams, and brooks of the Canuku Mts. 8–10 in. = *Hoplerythrinus unitæniatus* (Spix).
73. *Erythrinus salvus* Agassiz, 632.	Small forest streams and standing water. 10–14 in. = *Hoplerythrinus unitæniatus* (Spix).
74. *Macrodon trahira* Müller, p. 632.	Generally distributed in British Guiana. = *Hoplias macrophthalmus* Pellegrin.
75. *Macrodon brasiliensis* Müller, p. 633.	Generally distributed, British Guiana. 12–14 in. = *Hoplias malabaricus* (Bloch).
76. *Anodus alburnus* Müller & Troschel, p. 633.	Lake Amucu and swamps of the savannah. Up to 10 in. = *Curimatella alburna* (Müller & Troschel).
77. *Anodus ciliatus* Müller & Troschel, p. 633.	Lake Amucu. 6–8 in. *Curimatus ciliatus* (Müller & Troschel).
78. *Pacu nigricans* Spix, p. 633.	Generally distributed, British Guiana. 6–8 in. = *?Pygocentrus piraya* (Cuvier).
79. *Hemiodus unimaculatus* Müller & Troschel p. 633.	Essequibo. 6–8 in. = *Anisitsia notata* Schomburgk.
80. *Piabuca argentina* Cuvier, p. 633.	Lake Amucu and swamps of the savannah. 3–4 in. = *Piabucus dentatus* Kœlreuter.
81. *Chilodus punctatus* Müller & Troschel, 634.	Still water of the savannah. 3–4 in. = *Chilodus punctatus* Müller & Troschel.
82. *Schizodon fasciatus* Agassiz, p. 634.	Upper Rupununi, Rio Branco, Takutu, and the swamps near these. = *Chilodus punctatus* Müller & Troschel.
83. *Leporinus fasciatus* Müller & Troschel, p. 634.	Pirara and nearby swamps. = *Leporinus fasciotus* Bloch.
84. *Leporinus nigrotæniatus* Müller & Troschel, p. 634.	Abundant in upper Pomeroon and its tributary forest brooks. 4–6 inches. = *Leporinus nigrotæniatus* (Schomburgk).
85. *Leporinus maculatus* Müller & Troschel, p. 634.	Abundant in Rupununi and Awaricuru. 6–8 in. = *Leporinus maculatus* Müller & Troschel.
86. *Leporinus frederici* Agassiz, p. 634. Bloch.	Pomeroon. 12–14 in. = *Leporinus friderici* Bloch.

87. *Tetragonopterus argenteus* Artedi, p. 634. Lake Amucu. 4–6 in. = *Tetragonopterus argenteus* Artedi.

88. *Tetragonopterus maculatus* Müller & Troschel, p. 634. Rupununi and Essequibo and the swamps and morasses near by. 3–4 in. = *Pœcilurichthys bimaculatus* (Linnæus).

89. *Tetragonopterus melanurus* Müller & Troschel, p. 635. Upper Rupununi. 4–6 in. = *Creatochanes caudomaculatus* Günther.

90. *Tetragonopterus tæniatus* Jenyns, p. 635. Trenches and swamps along the coast. 1–2 in. = *Mænkhausia oligolepis* (Günther).

91. *Chalceus angulatus* Spix, p. 635. Essequibo and Rupununi. 6–8 in. = *Chalceus rotundatus* (Schomburgk).

92. *Brycon macrolepidotus* Müller & Troschel, p. 635. Lower Essequibo and Mazaruni. 6–8 in. = *Chalceus macrolepidotus* Cuvier.

93. *Brycon falcatus* Müller & Troschel, p. 635. Generally distributed, British Guiana. 6–8 in. = *Brycon falcatus* Müller & Troschel.

94. *Brycon schomburgkii* Müller & Troschel, p. 635. Plentiful in lower Essequibo. 6–7 in. = *Brycon falcatus* Müller & Troschel.

95. *Brycon pesu* Müller & Troschel, p. 635. Lower Essequibo and Mazaruni. 4–6 in. = *Holobrycon pesu* (Müller & Troschel).

96. *Exodon paradoxus* Troschel, p. 635. Plentiful in creeks of the upper Rupununi. 4–6 in. = *Exodon paradoxus* Troschel.

97. *Epicyrtus gibbosus* Müller & Troschel, p. Plantation drains and lower Essequibo. 4–6 in. = *Charax gibbosus* (Linnæus).

98. *Xiphoramphus falcatus* Müller & Troschel, p. 635. Essequibo and Pomeroon. 6–8 in. = *Acestrorhynchus* falcatus (Bloch).

99. *Xiphoramphus microlepis* Müller & Troschel, p. 636. Pomeroon, upper Essequibo, Rupununi, and Takutu. = *Acestrorhynchus microlepis* (Müller & Troschel).

100. *Hydrolycus scomberoides* Müller & Troschel, p. 636. Generally distributed. 2–3 ft. = *Hydrolycus scomberoides* (Cuvier).

101. *Agoniates halecinus* Müller & Troschel, p. 636. Cuyuni. 6 in. = *Agoniates halecinus* Müller & Troschel.

102. *Xiphostoma cuvieri* Spix, p. 636. Upper Essequibo, Rupununi, and Takutu. 2 ft. = *Hydrocynus cuvieri* (Agassiz).

103. *Pygocentrus piraya* Müller & Troschel, p. 636. Generally distributed in British Guiana. 10–12 in. = *Pygocentrus piraya* (Cuvier).

104. *Pygocentrus nigricans* Müller & Troschel, p. 636. Generally distributed. 11–12 in. = *Pygocentrus piraya* (Cuvier).

105. *Pygocentrus niger* Müller & Troschel, p. 636. Generally distributed, British Guiana. 16–20 in. = *Pygocentrus niger* (Schomburgk).

106. *Pygopristis denticulatus* Müller & Troschel, p. 637. Essequibo, Rupununi, Takutu, and near-by swamps. = *Pygopristis denticulatus* (Cuvier).

107. *Pygopristis fumarius* Müller & Troschel, p. 637.	Rupununi, Essequibo, and near-by swamps. 4–6 in. *Pygopristis denticulatus* (Cuvier).
108. *Serrasalmo rhombeus* Müller & Troschel, p. 637.	Rupununi, Takutu, and near-by swamps. 12–14 in. = *Serrasalmo rhombeus* (Linnæus).
109. *Serrasalmo aureus* Spix, p. 637.	Essequibo and Rupununi. 6–8 in. = ? *Serrasalmo gymnogenys* Günther.
110. *Catoprion mento* Müller & Troschel, p. 637.	Lake Amucu. 3–4 in. = *Catoprion mento* (Cuvier).
111. *Myletes rubripinnis* Müller & Troschel, p. 637.	Lower Essequibo. 4–6 in. = *Myloplus rubripinnis* (M. & T.).
112. *Myletes schomburgkii* Müller & Troschel, p. 637.	Rupununi, Takutu, Zuruma, as well as swamps of the savannah. 4–6 in. = *Myleus pacu* (Schomburgk).
113. *Myletes hypsauchen* Müller & Troschel, p. 637.	Standing water, Tapacuma Lake. 3–4 in. = *Metynnis hypsauchen* (Müller & Troschel).
114. *Myletes latus* Müller & Troschel, p. 638.	Generally distributed in British Guiana. 10–12 in. = *Myloplus rhomboidalis* (Cuvier).
115. *Myletes asterias* Müller & Troschel, p. 638.	Essequibo and Mazaruni near falls. 2 ft. = *Myloplus asterias* (Müller & Troschel).
116. *Myleus setiger* Müller & Troschel, p. 638.	Essequibo near cataracts and in swift water. 10–12 in. = *Myleus pacu* (Schomburgk).
117. *Osteoglossum bicirrhosum* Spix, p. 638.	Still water of Rupununi, Takutu, Rio Branco and near-by swamps of savannah, and in Lake Amucu. ½ ft. = *Osteoglossum bicirrhosum* Vandelli.
118. *Arapaima gigas* Müller, p. 638.	Generally distributed in streams of British Guiana. 8–10 ft. = *Arapaima gigas* Cuvier.
119. *Megalops atlanticus* Valenciennes, p. 639.	Along the coast. 2 ft. = *Tarpon atlanticus* (Cuvier & Valenciennes).
120. *Elops saurus* Linnæus, p. 639.	Along the coast. 12–14 in.
121. *Engraulis thrissoides* Müller & Troschel, p. 639.	Cuyuni. 4–7 in. = *Stolephorus spinifer* (Cuvier & Valenciennes).
122. *Gymnothorax ocellatus* Agassiz, p. 638.	Plantation drains and standing water. 3–4 ft. = *Lycodontis ocellatus* (Agassiz).
123. *Gymnotus electricus* Linnæus, p. 639.	All fresh water of British Guiana. 7 ft. = *Electrophorus electricus* (Linnæus).
124. *Sternopygus virescens* Müller & Troschel, p. 639.	Lake Amucu and forest streams. 18–20 in. = *Eigenmannia virescens* (Valenciennes).
125. *Sternopygus lineatus* Müller & Troschel, p. 640.	Small forest brooks. 6–10 in. = *Eigenmannia virescens* (Valenciennes).
126. *Rhamphichthys rostratus* Müller & Troschel, p. 640.	Demerara River. 4–6 ft. = *Rhamphichthys rostratus* (Linnæus).

127. *Sternarchus oxyrhynchus* Müller & Troschel, p. 640.	Lower Essequibo. 16–18 in. = *Sternarchorhynchus oxyrhynchus* Müller & Troschel.
128. *Synbranchus marmoratus* Bloch, p. 640.	Drains of the plantations. 2–3 ft. = *Synbranchus marmoratus* Bloch.
129. *Chelichthys punctatus* Müller & Troschel, p. 641.	Sand banks of the coast. 12–15 in.
130. *Chelichthys psittacus* Müller & Troschel, p. 641.	Mouths of the Waini and Barima and sand-banks of the coast. 4–6 in. = *Colomesus psittacus* (Bloch & Schneider).
131. *Chelichthys asellus* Müller & Troschel, p. 641.	Fresh water, Barima. 4 in. = *Colomesus psittacus* (Bloch & Schneider).
132. *Syngnathus pelagicus* Linnæus, p. 641.	Salt water near the coast. 10–12 in.
133. *Carcharias* (*Prionodon*) *henlei* Valenciennes, p. 641.	Found on whole coast, especially near the mouth of the Demerara. 4–6 ft.
134. *Carcharias* (*Prionodon*) *oxyrhynchus* Müller & Henle, p. 642.	Coast, especially near the mouth of the Demerara. 6–8 ft.
135. *Sphyrna tudes* Müller & Henle, p. 642.	Whole coast, especially mouth of Demerara. 4–6 ft.
136. *Pristis pectinatus* Latham, p. 642.	Coast. 4–6 ft.
137. *Tæniura motoro* Müller & Henle, p. 642.	Mouth of the Zuruma. 6–8 in. = *Potamotrygon hystrix* (Müller & Troschel).
138. *Trygon garapa* Schomburgk, p. 642.	Takutu and Rio Branco. 8–10 in. = *Potamotrygon hystrix* (Müller & Troschel).
139. *Trygon strongylopterus* Schomburgk, p. 642.	Rupununi, Takutu, and Rio Branco. 8–10 in = *Paratrygon orbicularis* Bloch & Schneider.
140 *Hypostomus plecostomus* Valenciennes, p. 643.	Takutu and Rio Branco. 8 in. = *Plecostomus. plecostomus* (Linnæus).
141. *Hypostomus squalitus* Schomburgk, p. 642.	Essequibo, Rio Branco, and Takutu. = *Plecostomus emarginatus* Cuvier & Valenciennes.
142. *Phractocephalus hemiliopterus* Agassiz, p. 643.	Generally distributed in British Guiana. 2 ft. 11 in. to 4 ft. 2 in. = *Phractocephalus hemiliopterus* Agassiz.
143. *Pimelodus arekaima* Schomburgk, p. 643.	All rivers of the savannah. 2–3 ft. = *Rhamdia arekaima* Schomburgk.
144. *Pimelodus insignis* Jardine, p. 643.	Takutu and Rio Branco. = *Pimelodella cristata* (Müller & Troschel).
145. *Hypophthalmus dawalla* Schomburgk, p. 643.	Rivers of British Guiana. 2–3 ft. = *Ageneiosus brevifilis* Cuvier & Valenciennes.
146. *Myletes pacu* Schomburgk, p. 644.	= *Myletes pacu* Schomburgk.
147. *Prochilodus rubro-tæniatus* Schomburgk, p. 644.	Essequibo and tributaries. 18–20 in. = *Prochilodus rubrotæniatus* Schomburgk.
148. *Trygon histrix* Schomburgk, p. 644.	Rupununi, Takatu, and Rewa. = *Potamotrygon hystrix* (Müller & Troschel).

The Lau-lau is mentioned without referring it to any other name.

One other collection of note was made in British Guiana by a Mr. A Ehrhardt. He collected at Mocco Mocco and Arisaro, spending about two months on the Essequibo. Part of his collection is in the British Museum, part in the Berlin Museum. The portion in the British Museum was reported upon by Günther in his "Catalogue of Fishes in the British Museum," and in a short paper "On New Species of Fishes from the Essequibo," published in the Annals & Magazine of Natural History, December, 1863.

The new things described are: *Acara punctulata* = *Crenicara punctulata* (Günther); *Pimelodus holomelas* = *Rhamdia holomelas* (Günther); *Auchenipterus obscurus* = *Trachycorystes obscurus* (Günther); *Helogenes marmoratus* Günther; *Crenuchus spilurus* Günther; *Leporinus megalepis* Günther = *Leporinus maculatus* Müller & Troschel, and *Xiphorampbus ferox* Günther = *Acestrorhynchus falcatus* (Bloch).

As I have already stated in the introduction, in none of these papers was a definite locality given.

In recent years Mr. T. Sidney Hargreaves collected fresh-water fishes in British Guiana. They were deposited in the Georgetown Museum. Few have definite locality labels. Mr. Hargreaves published a series of articles in "The Argosy," a local paper, which were reprinted in book form. The booklet is only of local interest, and adds but little which is of a sufficiently specific nature to be quoted in a scientific work.

CHAPTER III.

GENERAL ACCOUNT OF THE EXPEDITION.

Accompanied by Mr. S. E. Shideler, I sailed from New York on August 23, 1908, arriving in Georgetown on September 6th.

From August to December is the long dry season in Guiana. In consequence the upper portions of the rivers are lowest in October and November, and the fishes are then concentrated in the channels of the streams. We had rain during the first week of our stay in Guiana, but later were only once interrupted by rain or high water. While on the Guiana plateau at Holmia a rain lasting a day and a night caused the river to rise many feet.

FIG. 1. Mouth of the Demerara River at Georgetown, British Guiana.

The two main objects of the expedition have been outlined in the Introduction. I desired to secure as many characins as possible and to compare the fauna of the plateau with that of the lowland. The former became an incident in the study of the latter question. To get an idea of the lowland fauna a series of collections in fresh water was made at sea-level within tidal influence from Lama Stop-Off to Morrawhanna, Wismar, Malali, and Bartica. Above tidal influence collections were made at Rockstone, Crab Falls, Konawaruk, and Warraputa, in the Essequibo and along the Potaro from its mouth to the Kaieteur. The fauna of the plateau was studied in the Potaro from the Kaieteur to the Aruataima Cataract.

Our equipment consisted of two barrels of alcohol, ten gallons of formalin, a Baird collecting-net, having a quarter of an inch mesh, fifteen feet long and five feet deep, a similar net forty-five feet long and seven feet deep, a net one hundred and fifty feet long with one-inch mesh in the wings and half-inch mesh in the other seventy-five feet, several gross of vials, several glass stoppered bottles, numerous empty one-pound coffee-tins, several five-gallon galvanized iron cans with screw-tops, one large galvanized iron can, buckets, etc. Kerosene tins were used in shipping specimens home.

Immediately upon my arrival I rented a house of two rooms named "Charity," which stood between two others called "Faith" and "Hope." The preliminaries of attending to the customs, moving in, making several trips to the bank and the office of the Consul before my draft was accepted, making calls, and securing transportation, consumed Monday and Tuesday, September 7th and 8th. On Wednesday at 5 A.M. I visited the market, and from that time forward until

Fig. 2. A trench in Georgetown.

my return from the Kaieteur every calory of energy was consumed for the one object of making the trip successful.

Georgetown is but a few inches above high tide; parts of it, in fact, are below tide. Many of the streets are provided with a wide central trench for drainage. Some of these are provided with tide-locks. One canal brings water from the Lamaha Conservancy, concerning which a little more later. The trenches are

planted with various native and exotic water-plants, one with *Victoria regia*, one with lotus, and so forth. The Lamaha trench is abundantly supplied with indigenous water-plants.

We began seining in the trenches of Georgetown as soon as our baggage was cleared and other preliminaries were attended to, and devoted four days to them. Toward the end of our stay in the country Mr. Shideler devoted himself again to the trenches, and particularly to those of the Botanic Garden, one of which he drained of its water, the results being given in a list published in a later chapter.

We took altogether thirty-nine species (to which Mr. Ellis has added another) from the trenches, four of which we found nowhere else in Guiana: *Plecostomus watwata*, the sea-hassar, *Ctenobrycon spilurus*, *Pœcilia vivipara*, and *Acanthophacelus melanzonus*.

The first is found from Georgetown along the coast to Pará. The second has been taken only in Georgetown and Surinam. A close relative is exceedingly

Fig. 3. View of the lowlands looking seaward from the railway near Mahaica.

abundant in the Amazons. The third is widely distributed in the West Indies and South America, while the last has not been taken elsewhere. The water in most of the trenches in which we collected is fresh; that in a muddy pond at the lower end of the town may be at times contaminated with brackish water. Few of the species characteristic of brackish water were taken in the trenches. There were no

marine cat-fishes or Banjamans, both groups excessively abundant in the brackish water.

The species most abundant were *Pristella riddlei*, a highly colored little characin first reported from the Orinoco and also found at Wismar; *Hemigrammus rodwayi*, another little characin confined to Georgetown and the northwest coast; the widely distributed characins *Pœcilurichthys bimaculatus* and *Charax gibbosus*, the latter of which was most abundant of all; the eels, *Sternopygus macrurus*, *Eigenmannia virescens*, the pœcilid "Millions" and the cichlid *Cichlasoma bimaculatum*.

Fig. 4. View of the drainage canal at Cane-Grove Corner.

The fauna of the trenches as a whole is poor as compared with that of the interior. This character the trenches share with the streams of the northwestern territory near the coast, and the waters about Lama Stop-Off. Many of the species are so small that our nets having one-quarter inch mesh permitted them to get through without difficulty. This may in part account for the apparent restriction of some of the species in the different trenches. Of *Pristella riddlei* we took with our nets but eight specimens in the Georgetown trenches, while in the trench of the Botanic Garden, which was drained, we obtained two hundred and thirty-three.

Having packed the specimens from Georgetown we left on the 15th for Lama

Stop-Off. It may be reached either by boat directly through the canal, or by rail and boat by way of Mahaica. Arrangements were made for us to go *via* Mahaica. The railroad runs through a flat country grazed by cattle, often standing up to their knees, or even deeper, in water. In places cocoanut-plantations abound and at frequent intervals canals run across the country to the ocean. Burnt clay is used in ballasting the railroads and in building the roads. Between the station at Mahaica and Cane-Grove Corner are a number of sugar-estates, all traversed by canals.[11] At Cane-Grove Corner the Lama Water Conservancy begins. It is a large tract of swampy savannah converted into a pseudo-lake, or water reservoir, by surrounding it with a ditch or canal and an outer embankment. At Lama Stop-Off and Maduni Stop-Off two streams, the Lama and the Maduni, tributaries of Mahaica Creek, formerly draining the savannah, are " stopped off " or dammed.

[11] The following from Rodway gives a picture of a single plantation:

" One of the principal estates situated on the east coast of Demerara is two hundred roods on façade by the full depth of two thousand two hundred and fifty roods, i. e., about half a mile wide by five and a half deep. In front is the seashore, to protect which mangrove and courida bushes are allowed to grow, inside of which a dam of earth is thrown up, the excavation alongside forming a drain for carrying off any salt water that may come over during high tides. At a short distance within the front dam comes the public road, which extends along the coast, and which is kept up at the expense of the estate owner, as far as it extends through his property. Beyond the road, which with its two canals at the sides forms a second dam, comes about a mile of grassy land which is used for pasturing cattle, horses, and mules belonging to the plantation. Then comes the railway, near which is the draining engine and kokers or sluices of the canefields, which commence immediately behind this third defence. Beyond a mile or so of pale green sugar-cane come the plantation buildings, which consist of the sugar factory, manager's residence, house for the overseers, hospital, school-house, one or two shops, and the labourers' cottages, which last are very numerous. This group of buildings forms, to all intents and purposes, a self-contained village, the manager's house, standing in the midst of a fine garden, representing the mansion of the squire, while round him live as many mechanics and labourers as are necessary to carry on the cultivation and factory. Beyond this village come interminable fields of canes as far as the cultivation extends, where a back dam protects it from floods. The plantation under review had some years ago nine hundred and thirty-five acres, or exactly half its area, planted with canes, and produced over fifteen hundred hogsheads of sugar annually. The remaining portion comprised three hundred and fifty-eight acres in pasture and bush, one hundred and sixty-two acres not then empoldered, one hundred and ninety-eight acres in dams, parapets, and trenches, one hundred and sixty-two acres of swamp in front, above low water mark, but outside the sea dam, and fifty-three acres covered by the buildings, garden, public road, railway, etc. From the number of acres in dams and trenches it may be seen how important this part of the economy of the plantation must be. On every hand is an earthen dam with corresponding canals, these latter being cut off from outside by flood-gates, so that no water from sea or swamp can penetrate, while the rainfall of the plantation itself is run off through the sluices at low water, or in very heavy weather, by means of the draining engine. These draining canals are connected with other trenches between every field, and these again with the ditches of each bed of canes. With such a perfect system of canals it has naturally followed that sugar canes are brought to the factory by water, and to complete the communication a middle dam and two canals are carried through the center of the plantation to the factory and thence up to the railway, or to the shipping-trench, where the droghers take the produce to the port by sea."

We embarked on the canal a Cane-Grove Corner and went about nine miles to Lama Stop-Off, where we made our headquarters, as the guests of Mr. St. Aubyne from the 15th to the 19th of September. Lama Stop-Off, according to a map at hand, is about twenty-two miles from Georgetown in a straight line. Lama Creek below the dam is influenced by the tide so that the top of the dam is but a few feet above Georgetown.

Fishes are exceedingly abundant at Lama Stop-Off, although the number of species does not seem to be large. Undoubtedly several more species might have been secured if we could have used dynamite or poison. We arrived at nine in the evening and fishes could be heard jumping out of the water in all directions. We were awakened in the morning by the howling of monkeys. The entire force at the command of Mr. St. Aubyne was put to work to use every device known to him, or brought by us, to gather everything there was in the water.

A naked negro baby caught the enthusiasm, walked into the edge of the water with a market basket, and made a dip, catching a specimen of *Carnegiella!* It

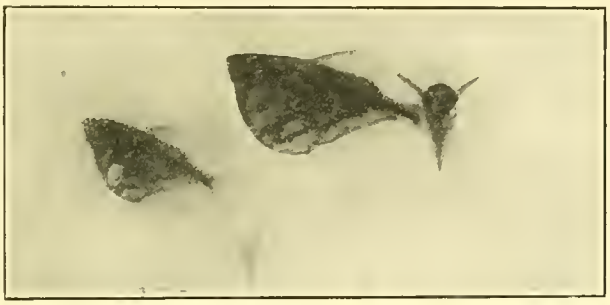

Fig. 5. Photograph of *Carnegiella strigata* in aquarium.

was the first time the fish had been caught since it was described by Günther from his poor material without a known locality. Naturally I was very anxious to catch more. In spite of all our efforts we did not catch a second specimen at this place. We found it later at Maduni Stop-Off and in other places. Cichlids were very abundant here, and the delicious luckanance (*Cichla*) was more abundant here than we found it elsewhere. It gave me particular pleasure, in honor of Mr. St. Aubyne, to apply the name *Pristella aubynei* to the species from this place, of which we collected more specimens han of any other.

We seined both in the canal and below the dams at Maduni Stop-Off and Lama Stop-Off. In all we secured forty-nine species, five of which were not taken elsewhere: *Rhamdia holomelas, Ageneiosus brevifilis, Nannostomus simplex, Pristella aubynei,* and *Hyphessobrycon minimus.* The first three are certainly found elsewhere

n the colony, and the fifth is a minute species imperfectly known from the few specimens secured.

Although the Georgetown trenches are a direct continuation of the canal at Lama Stop-Off, we secured twenty-eight species at the latter point which we did

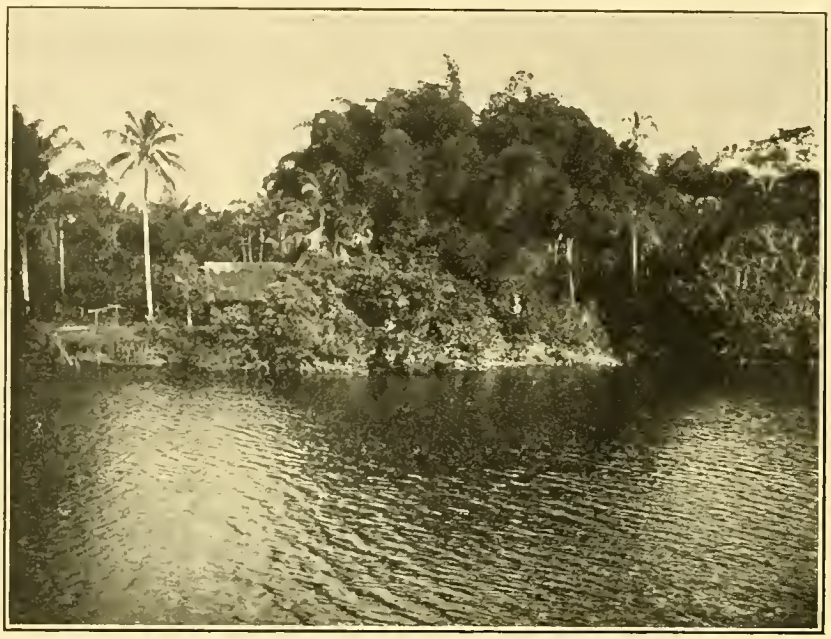

Fig. 6. View on the right bank of the Demerara River.

not get at Georgetown. Part of the twenty-eight have come from below the dam at Lama Stop-Off, but even this reach of water is but recently disconnected from the general system.

From Lama Stop-Off we returned to Georgetown on the 19th of September, packed and forwarded the fishes collected to the United States, and prepared to go inland. Mr. Shideler left for Wismar on the 23d and I followed on the morning of the 24th. The steamer left Georgetown at 8 A.M. and reached Wismar at 4:30 P.M. The water is muddy until Berlin is approached and becomes blackish further up. Wismar is about sixty-five miles above Georgetown in a straight line. The Demerara is navigable for ocean-going sailing-vessels to this point, and is affected by the tide to the first cataract at Malali, about one hundred miles from Georgetown, in a direct line. The entire region from Georgetown to Wismar is flat, except for occasional sand-hills. Creeks enter the Demerara from both sides about Wismar. At Christianburg a creek has been dammed and a canal brings the water to the sawmill on the river. We collected in the Demerara river at Christianburg and at Wismar, in the Christianburg canal, and in the creeks emptying into the

Demerara. It had become evident that during the heat of the day but few fishes could be taken in the shallow water of the main stream, so that from this time on the daytime was used to explore for likely places, which were then seined at night.

Most of the mouths of the creeks about Wismar are provided with partial fences built of poles and palm or banana leaves. The center is ordinarily left open for the flow of the tide. A mat can be placed in the gap, which will prevent fishes from coming out of the creek. When the tide is high at night and fish have

Fig. 7. View of creek, filled with brush-wood above Wismar at low tide. Indians are poisoning the creek.

left the main stream and entered the creek the mat is put in place. In the morning when the tide is out the fishes trapped are either killed with a cutlass, or poisoned. Many of our specimens were obtained in this way. The creeks are so full of brush that all ordinary methods of fishing are out of the question. Trap-nets could probably be used effectively instead of the fence in the mouths of the creeks.

Except in a very few favorable places the banks and shallows of the Demerara are so profusely overgrown with *Caladium arborescens* that the seine could not be used. I engaged fishermen to collect for me some distance below Wismar and had a creek poisoned at Kumaka, several miles above Wismar. From all of these places I secured ninety species, five of which were not taken elsewhere. The specimens not taken elsewhere are: *Ageneiosus guianensis*, *Pœcilobrycon harrisoni*,

Acanthophacelus bifurcus, *Archicheir minutus*, and *Steatogenys elegans*. Of these *A. minutus* is known by but one specimen. The first three are new, and *S. elegans* is found in the Amazons. Mr. Shideler went up to the cataract at Malali but secured only twenty-three species, of which *Myloplus asterias* was the only one I

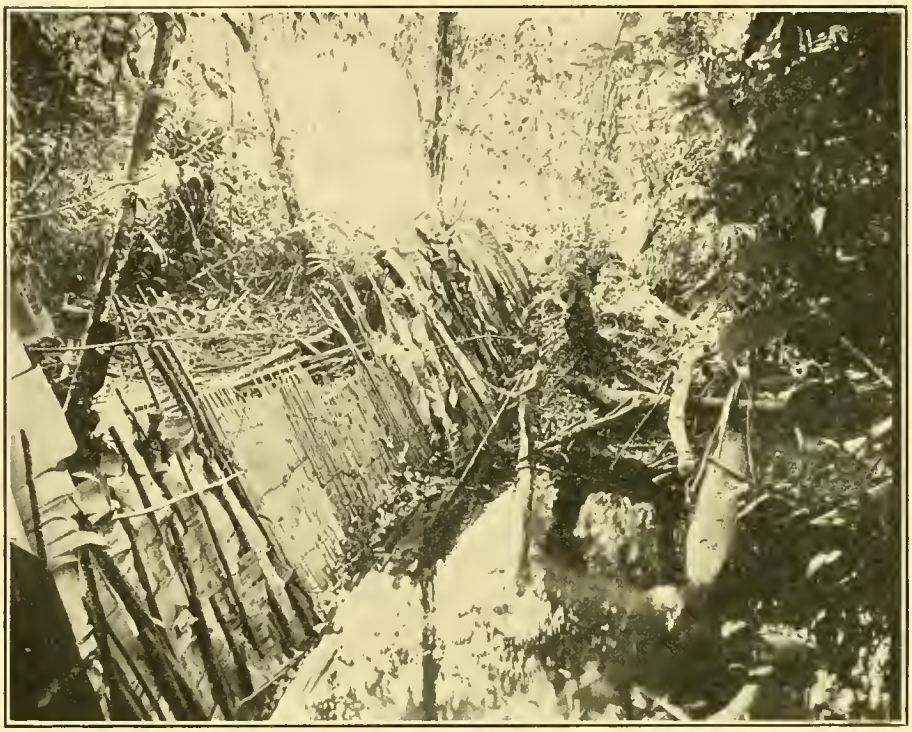

Fig. 8. Fish-fence made of reeds and banana leaves on creek above Wismar. Indian with bow and arrow ready to shoot larger fishes brought up by poison.

did not get elsewhere. A list of the fishes which do not extend so far inland and another list of those which do not extend so far down stream as Wismar are given later.

On September 29th, at 5:30 P.M., we took the train for Rockstone. Rockstone consists of an hotel, terminal station of the steamer connecting with the railroad, a small store, and a number of cottages for workmen. All goods for the gold-mines, and all rubber coming from the interior are transferred here to avoid the cataracts in the Essequibo below Rockstone. The Essequibo is here divided into two channels by Gluck Island. At the time of our visit rocks were exposed at the stelling and a short distance below Rockstone. At the bend of the river above Rockstone there was an extensive sand-bar exposed. We collected at the Rockstone stelling, in the railroad-cut running into the river just below the town, in a small woodland creek on Gluck Island, and on the sand-bank at the bend above Rockstone. The

richest ground was found in the brook on Gluck Island and the slough between the sand-bank and the shore of the river. A haul made at night on the sand-bar was also very successful.

A portion of a letter describing my first day at Rockstone follows:

Fig. 9. View on bayou back of Christianburg. Indian fishing from his corial.

September 30th, 1908.

"Very early in the morning I engaged two Indians who were on a balata boat waiting for a crew to go up the Rupununi. They did not know English, neither did they know how to fish, and I got exasperated, till Shideler went in to show them. Hereafter I shall always dress to go into the water myself. We worked faithfully along the stelling and below, with the poorest success I ever had anywhere. We could see fishes galore, one especially (*Chalceus macrolepidotus*) lustrous plumbeous, with the most gorgeous, maroon colored fins, flaunted its colors in my face, but it was impossible to get at it. At ten we came to the hotel, I completely dead beat, for this was the place where we were told we should 'catch fishes.'

"As we were waiting for breakfast a band of Indians came along, a man and about six girls and women. After parleying it turned out that they were going to poison a creek. We asked them to

wait at the station till we could join them. We rushed through breakfast, caught our two Indians, who were just ready to eat their breakfast, and made them take it along, and then went after the fishing Indians, who started as soon as they saw our boat come out of the creek. After skirting Gluck Island some time they stopped at a creek so small that I thought it could have no fishes.

Fig. 10. Indian women pounding leaves in a hollow on the ground preparatory to using the pulp for poisoning a stream on Gluck Island.

Two of the Indian women scraped a small depression into the ground, cut two sticks and used them as pestles and the depression as a mortar in which they pounded a basketful of leaves into a pulp.[12] They then built a fence across the creek with palm leaves, scraped the mud from their mortar into balls and squeezed them into the water some distance up the creek. The Indians and myself were soon knee-deep in water and mud, picking up the fishes which came to the surface. The little ones died in numbers on the banks, the bigger ones revived. I had a set-to with the Indian women because they did not want to sell me all the catch. We finally compromised, and I took all I wanted, giving them the larger ones. I supposed they wanted several dollars, but they asked only two shillings. I gave them three and we were both happy. After my transaction with the women was completed, the man gleefully held up a fine luckananee he had shot with an arrow.

[12] I regret to say that I did not get the name of this poison.

"On the way home we stopped on some rocks, dikes that run across the river, and secured crabs, and another *Loricaria*.

"I ate dinner with a somewhat better feeling, but determined to use our big hundred-and-fifty-foot net at the sand-bank after dinner. The porters were all gone when we got to the station, but I was able to pick up a couple of negroes, and took one of our Indians. Mr. Kingsland, the agent at Wismar, went along. The crew played the most interesting tunes with their paddles. Whenever he felt like it, the leader, by a peculiar stroke with the paddle, would get all of them to hit the boat during a definite part of the stroke. It produced surprising results and varied the monotony of the long row. After we had gone what I thought twice the distance, we discovered that by staying on the wrong side of the river we had overshot our mark and had to go back. Soon our boat got stuck in the mud at the upper end of the bank, but finally landed on a place that must have been made for us. It was a shallow bay on the upper end of the sand bank, a hundred and fifty feet across with a sandy bottom. We stretched the big net across and hauled out at the head of the bay.

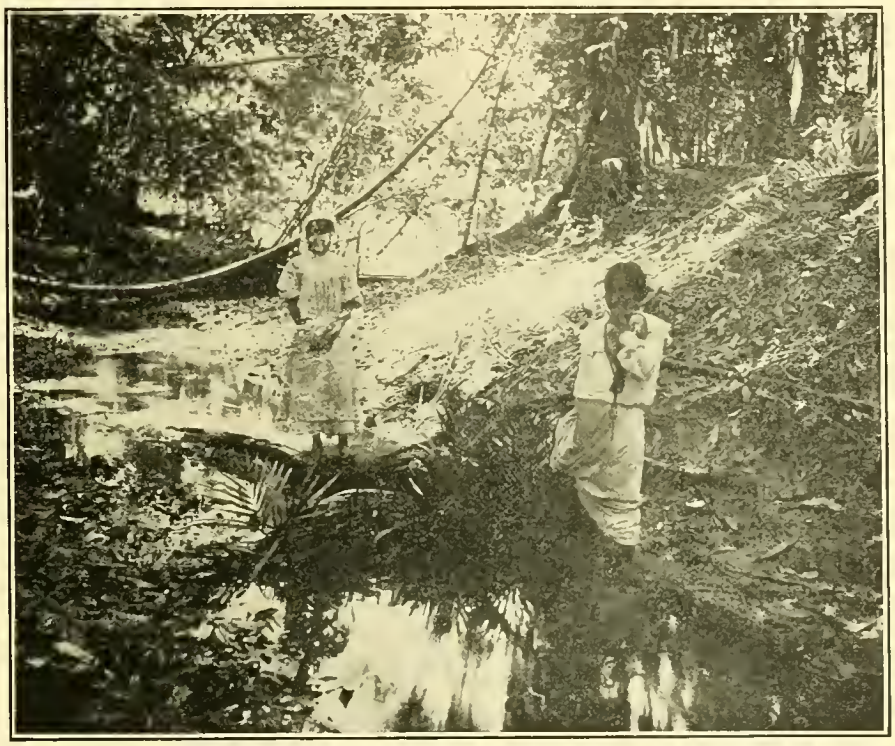

FIG. 11. Small stream on Gluck Island dammed by Indian women before putting in the poisonous leaf-pulp.

Fish flopped in every direction, dozens went over the net, one of them went at one of the men and made him jump. At the critical moment the enthusiasm got the better of even our Indian, and he ran ashore with the top of the net and let half the catch out. As it was we had two buckets full of specimens. I gave Mr. Kingsland a luckananee weighing seven pounds, and the crew had enough to make the haul historic for all time to come. We got home at 12:30 A.M."[13]

[13] I recognized seventy-one species on the day following. The number was probably nearer ninety, for in the final examination I found I had taken sixty species in two or three hours out of the small brook on Gluck Island.

The first day of October until evening was devoted to sorting and preserving fishes. *Prochilodus* gave us much trouble. Full strength alcohol and formaline injected did not keep these specimens from beginning to decay. In the evening we seined on the rocks of the stelling and in the railroad-cut mentioned above. At the stelling we caught so many *Hemidoras carinatus* and allies with erected spines that it took us a long time to untangle them from the net. Each pectoral spine of these catfishes is provided with retrorse hooks, the spines are erected when the fish feels himself caught, and each spine must be individually disentangled from the net.

On the second of October we went to the Rockstone sand-bar with our two Indians. We were soon joined by seven porters who came from Rockstone to get sand and who helped us pull the large net at the lower end of the sand-bar. The most important captures we made consisted of specimens of *Geophagus* carrying young in their mouths. The outer edge of the bar was almost barren, but yielded a few minute, translucent specimens of *Characidium*, which so closely resemble our sand-burrowing darters that they amply repaid for the water-hauls. But the greatest

Fig. 12. Edge of bayou between right bank of Essequibo and outlying sand-bar at Rockstone.

success was obtained in a bayou between the upper half of the bar and the land. Here we collected a large number of small fishes. The Indians took half a bushel. There is a great general similarity between the contents of the net here and one drawn at any similar locality in the Mississippi valley, although not a single species

or genus occurring in the Mississippi valley was found in the catches. Here we secured the only specimen, greatly mutilated, of the widely distributed *Symbranchus*, and the young of many species of large fishes. Before starting for the sand-bank I had an opportunity of securing a lau-lau, but in the hurry of getting off, and on account of a momentary fit of penuriousness, I took only the head.

On October third I returned to Wismar to make purchases for our trip to Tumatumari, and incidentally arranged to have a creek "stopped." I returned to Rockstone in the evening and sent Mr. Shideler to bring over the catch the next day at 2 P.M. Among other things he brought the rare *Rhamphichthys*. It is a long-snouted, sword-shaped, gymnotid eel.

On October 4th I watched some of the natives dynamite about the Rockstone stelling and packed most of our catch for shipment.

In the work of enumeration, which has taken two full years since my return, I find that Rockstone, where our fishing began so discouragingly, is the richest in species of all the localities examined. This was no doubt due to the fact that conditions for collecting were favorable. The water was low and we fished exhaustively in a variety of places. No doubt many channel fishes living here we did not get. *Pseudoplatystoma*, *Phractocephalus*, and others, should be found there. Altogether we got one hundred and thirty-three species, eighty-three of which were characins. Of the one hundred and thirty-three species fourteen were not taken elsewhere:

1. *Xenacara gymnorhynchus.*
2. *Hemiodontichthys acipenserinus*
3. *Aphiocharax melanotus.*
4. *Aphyocharax erythrurus.*
5. *Mœnkhausia megalops.*
6. *Hemigrammus iota.*
7. *Hyphessobrycon rosaceus*
8. *Hyphessobrycon riddlei.*
9. *Hyphessobrycon gracilis.*
10. *Phenacocharax hemigrammus.*
11. *Acestrorhynchus nasutus.*
12. *Rivulus lanceolatus.*
13. *Rivulus frenatus.*
14. *Crenicara punctulata.*

Some of these are known to have a very wide distribution. Number 2 for instance, extends to Paraguay; Nos. 6 and 9 are found in the Amazon; No. 8 in the Orinoco. Others are known only from the specimen collected. A critical examination of this list of uniques thus shows that these lists mean nothing except what is on the surface.

On Monday, the fifth of October, we started for Tumatumari, but on account of various accidents to the boats we had to tie to the shore over night. Being overtaken on the following day by another boat, we went on with it to Tumatumari, which we reached at 7:00 P.M. I called on Mr. Edward Bovallius, the representative of the Essequibo Exploration Company, and on Mr. Brummel, one of the government officers, and began seining on the following morning.

Tumatumari owes its existence to a cataract in the Potaro River. The goods brought up by the launch to the lower landing are transported by cart to the upper landing, and this transport gives employment to nearly all the inhabitants. At the time of our visit the stream was confined to the northern channel, the southern channel being entirely dry. We made headquarters in the Sproston's rest-house, from which point we had a view over the cataract. We collected on sand-bars

Fig. 13. Looking across the Rapids of the Potaro River at Tumatumari. Papaya-trees in foreground.

above and below the cataract, in the cataract itself, and in a little stream emptying from the north just below the cataract. Our experience in fishing may again be quoted from letters sent home.

"We found a brook and went up it. I enjoyed the water, it was nice and cool. The water we have to drink is in an iron tank out in the broiling sun and no ice is to be had nearer than forty-seven miles. We fished upstream until we came to a deep pool. The nondescript helping us did not know "how," and stepped on a spiny palm branch besides, so I got into the water to take his place, and told him to take a big club and beat the water to drive the fishes down. He did this slowly. Shideler and I then took up the lead line of the net, for the banks were so steep and full of snags there was no place to haul the net ashore. We were walking down stream with the bag of the net in the water to a place where we could land, when Shideler said, "I believe we have an electric eel, for I have had two slight shocks."

"I envied him, but too soon, for just then I got a good shock from ankle to knee and I jumped and yelled, not so much from pain as from the unexpectedness of the shock.

"We found we had five eels in the net, the largest three feet long, and it took manœuvering to get them into the buckets. I received several more slight shocks before it was accomplished.

"We rested in the afternoon, so as to be ready to go out at night. It is scarcely possible to catch anything in the river in daytime. We were simply looking about to see where we could haul at night. In crossing the river at night I think our boat struck half the sunken rocks, until I insisted that the water be baled out before we risked another shock. On the sand-bank across from the lower landing we caught two more electric eels in a net well filled with fishes. It was surprising how soon everything became quiet in the flopping netful of fishes with such customers in their midst. I opened one of the eels and found small fishes in its stomach. I put a twig through the gill of the largest eel, for we proposed to eat it; the other eel we wanted to take home alive to see some sport, and I placed it in a live-net. I had the eel in one hand, and in order to pick up the net put the lantern in the same hand, but as soon as the lantern touched the eel I got a shock through the handle. It was not a heavy shock, but I did not know how much heavier it might become, and so gave up that way of managing.

"When I came to pick up the net containing the other eel, I got another slight shock, and concluded I needed help to carry them. We ate part of the largest; the electric organ was pasty and the rest was so full of bones that we did not succeed with it.[14]

"Thursday morning Shideler went to fish above the falls preparatory to fishing at night. I took care of the fishes, but by night we were both so tired we postponed the fishing till Friday night, when we caught a seven pound luckananee, which, profiting by previous experience, we skinned and ate. On one haul our net was again full of *Hemidoras*. These became so tangled up in the net that it took an hour or more to get them out. One of them was new (*Leptodoras linnelli*)."

On the 10th of October I went to Potaro Landing to make arrangements to ascend to the Kaieteur. Mr. Shideler went up the next day to watch some poisoning, but returned in the afternoon with Mr. Linnell, who had come down from Holmia with a crew of Indians.

Mr. Linnell, the representative of the Essequibo Exploring Company at Holmia, and Mr. Bovallius, the representative at Tumatumari, after consultation, lent me the crew of Indians which brought down Mr. Linnell, under the Indian captain William Grant. They also placed their bateaux between Kangaruma and

[14] The "numb fish" early excited the interest of naturalists and thus directed attention to the fish-fauna of the Guianas. The first notice of the fishes of the Essequibo was an account of the doings of the electric eel, and in the second paper Bancroft attributed the shocks delivered by the electric eel to electricity. Humboldt described how his assistants drove some horses into the water to exhaust the eels. It became generally accepted that this was the usual method of fishing, although it is doubtful whether this method was ever tried except on the occasion when Humboldt did it.

A comprehensive account of the electric eel was published by Sachs as a result of a trip to Venezuela for the special purpose of studying it. "Aus den Llanos," Leipzig, 1899, and "Untersuchungen am Zitteraal," Leipzig, 1881.

Holmia at our disposal. Our success on the expedition to the upper Potaro was largely due to the coöperation of Messrs. Linnell and Bovallius.

We started on a launch from Tumatumari on the 14th of October at nine o'clock in the morning. We were met at Potaro Landing by part of our crew, who carried a portion of our outfit about seven miles to Kangaruma. The crew returned to Potaro Landing the following day for the remainder of the goods. The latter part of the trip between Potaro Landing and Kangaruma was through the forest, the first two miles through a hot sandy road. I felt a slight fever on arriving

Fig. 14. Albert, one of the Indian bearers, transporting goods at Kangaruma.

at Kangaruma. The portage from Potaro Landing to Kangaruma, which can be made in two and a half to three hours, obviates the engagement of a series of cataracts between the two points. We left Kangaruma in the afternoon by a peculiar bateau. A tarpaulin covered the center of the boat where our goods were stored; in front sat three pairs of paddlers; behind several more paddlers. William was captain and steersman as well, until we picked up a corial at Amatuk and

"Trenchan" became steersman. Eddie, my cook, spent his time largely with the dog "Sunday." Part of our Indians were jolly, naked savages from near Holmia; the others were surly fellows dressed in shirt and trousers and had come from Brazil.

After about two hours rowing we camped beside a creek, Erukin. I attempted

Fig. 15. View looking up the Potaro River in the early morning. Glimpse of the Guiana Plateau in the distance.

a little fishing at night, but with the very poorest success. On our return trip we were more successful at this point.

On Friday, the 16th, we started at 6 A.M., and by eight were at Amatuk, where we remained till breakfast. We attempted to do some collecting on the sand-bank, but, as usual in the daytime, with very little success. At Amatuk the goods had to be carried to a boat above the twenty-five foot cataract. I had felt fine all the morning and enjoyed especially the lazily flopping Morphos crossing the river, and the flying fishes. The latter would dart up in front of us, cut through the water, leaving the breast or tail in the water and beating the water with their pectorals. One of the flying-fishes would cut through the water for forty feet or more and then leave the water entirely for five or ten feet. At the end of its flight it would fall sidewise into the water. At first it looked like a long, slender fish, but by watching near the end of the flight, when the momentum was gone, the disc-like shape could easily be made out. To make sure I asked the Indians

to point out the fish when we seined. William pointed out a long, slender *Creatochanes*, but the naked hunter shook his head, and with thumb and forefinger made a circle. We caught none in the Potaro, where we saw them frequently, but got them in abundance in the lower Demerara. *Gasteropelecus* is more apt in its flight than *Carnegiella*. Whole schools will sometimes leave the water and shoot over the surface.

After breakfast we rowed up through the gorge, which the Potaro has cut through the table-land beginning at Amatuk. The edges of the gorge have been

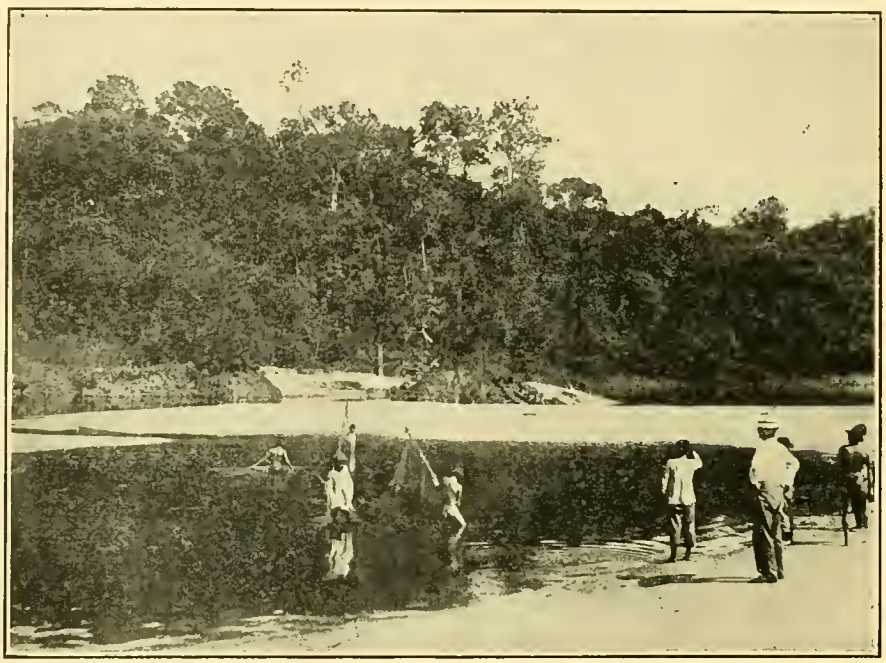

Fig. 16. Seining on a sand-bar below the Amatuk Cataract.

carved in a variety of ways which give them the appearance of high mountains. The valley is quite broad, indicating the great age of the gorge, which is a thousand feet deep.

We took with us a corial from Amatuk, planning to send Mr. Shideler back in it from the Kaieteur. The Indians shot a baboon on the way up to Waratuk, the next portage. We camped rather early in the day above Waratuk and during the night I had a particularly nasty case of chills and fever. By midnight I could scarcely stand, but enjoyed the great variety of new noises from the water and forest.

We started at 7:00 A.M. on the 17th and stopped at 8:00 to get our first glimpse of the pride of Guiana, the Kaieteur. The Kaieteur was hidden in mist

so early in the morning. We camped shortly afterwards at Tukeit, called "Tukui," or humming-bird, by the Indians, after the waterfall coming from the plateau opposite the camp. Our hunters killed four peccaries across the river, and young wild pork was a pleasant change from the canned meats. At Tukeit there is another cataract in the Potaro, and above it several more towards the foot of the fall. It is one of my regrets that time did not permit me to walk up to the Kaieteur.

We collected in the Potaro at Tukeit and the following morning at eight started to ascend the plateau. The path leads back from the river for a time, crosses Shrimp Creek, and then ascends very steeply to the top of the plateau. Here it is comparatively level again and runs through the woods to the edge of the savannah, or treeless tract, immediately about the fall.

FIG. 17. View on the Potaro River looking up stream at the point where the first glimpse of the Kaieteur Falls is caught.

After breakfast, at the edge of the savannah, Mr. Shideler and I, with William and another Indian, walked to the edge of the precipice and to the fall, while the rest of the Indians went on to pitch the camp and get the boats of the upper Potaro ready.

The scenery about the fall is unique. Looking down the stream one sees

the U-shaped gorge cut out by the Potaro in the level plateau. The Potaro is visible from time to time as it crosses from one side of the valley to the other. The best view of the fall itself can be had by climbing down on a ledge of rock at the edge of the precipice. I not only climbed down, but, all excitement with the fever,

Fig. 18. Exposed left side of the bed of the Potaro River at Tukeit in the dry season.

the steep climb, and the superb view, set up my camera on the ledge and took numerous photographs. I confess to feeling distinctly dizzy when I placed my head under the focusing cloth, knowing that if something should happen I and the camera would land on the rocks a thousand or so feet below. Not that I could find a finer place to die, but I was reluctant to start to "kingdom come" on such a heavy down grade.

After making about thirty exposures under varying conditions, we went to the camp in the bush some distance up the river. The fall is caused by an excessively hard conglomerate which overlies a softer sandstone. The savannah above the fall is in large part this naked conglomerate. In places bushes grow from cracks in the rocks. Many bunches of grass, or flowers grow from a little accumulation of soil that can be kicked from place to place along the surface of the rock. The afternoon of the 18th and part of the 19th were devoted to fishing and packing.

Mr. Shideler started down for Georgetown at 11:00 A.M. of the 19th, with three of the Indians. He collected about Potaro Landing, in the Botanic Garden, at Bartica and near Morawhanna, Issorora, etc., of the northwest coast. The crew who remained with me was divided between two boats. One boat, the "balahoo," was dispatched at once with the goods, while a few of the Indians, with William and myself, stayed till the following morning.

We started after the other boat on the 20th, at 6 A.M. It rained hard. All hands pulled with all their might on this, the home stretch. We reached the regular camping site at 3:00 P.M., but all the Indians were anxious to go to Holmia, which they said they could make in three hours. I was willing. By a supreme effort the three hours were cut down to two hours and twenty minutes, and at 5:20 P.M. we reached Holmia.

Holmia is the trading camp of the Essequibo Exploration Company. The

FIG. 19. Looking up the Potaro Valley from the brink of the Kaieteur Falls.

company has a store and depot surrounded by a few Indian huts. It is situated on the Potaro at the entrance of the Chenapowu river. My crew of Indians went out at once to collect poison, the root of a plant called "hiari" (?*Lonchocarpus*) under the guidance of the local Indian, Jordan. The Indians of the surrounding regions brought me fishes and we ourselves poisoned a small creek just below the

houses. Unfortunately, it rained heavily, so that the Chenapowu and the Potaro rose many feet and made fishing in them not profitable for some time. We went up the Potaro a distance further and poisoned two creeks just below the Aruataima cataract. In the cataract itself we could do nothing on account of the high water. William later collected in the cataract and sent me two new genera and three new

Fig. 20. Looking down the Canyon of the Potaro River from the brink of the Kaieteur Falls.

species, from which it would seem that further collecting would prove profitable at this point.

The character of the fauna of the plateau is discussed in detail in another place. It seemed that each creek we examined contained some one dominant form and a few stragglers. The dominant forms varied in different creeks.

I started from Holmia on October 27th, fully intending to return with Mr. Linnell, but I found at Tumatumari that he had gone to England, and I did not return. That I could go no further on the Potaro, could not cross over to the Ireng, is a lingering regret. We reached Savannah Landing at 12:00 and walked over to the Kaieteur to take a few more photographs.

We also poisoned another creek and collected in a swamp above the landing. We started down for Tukeit at 1:30 on the 29th of October. In crossing Shrimp Creek, which seemed quite impossible as a fish habitat, I caught a *Rivulus* with

my hand. I was surprised by the catch and more so by the sequel. The fish jumped out of my hand and stuck to a vertical rock by its tail and jumped from this to another point higher up on the same rock. It was lost on the way down to camp, so I sent William back the next day to poison the creek. He secured two species of *Rivulus* (*waimacui* and *breviceps*) and a *Characidium* (*vintoni*), all of them new. We collected about Tukeit in the afternoon, poisoning the creek just below

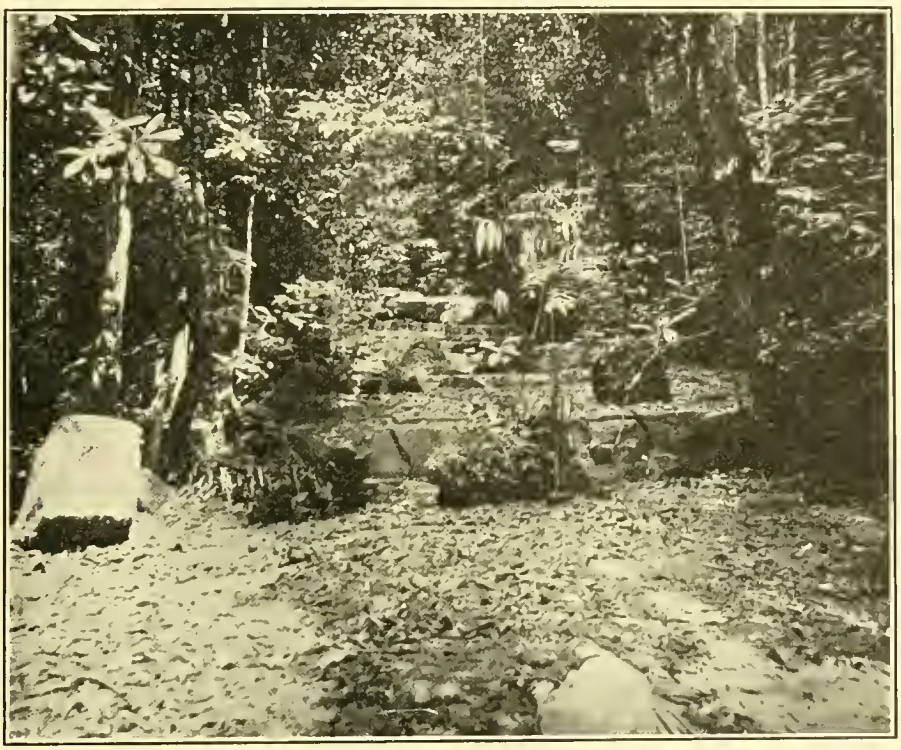

Fig. 21. View looking up the dry bed of Shrimp Creek. Figure of man in middle distance shows the height of the rocky steps. Follow indices on cut.

the landing with considerable success. The striking thing about the fauna at Tukeit is its evident contamination by the fauna of the plateau. *Helogenes* and *Pœcilocharax*, fishes of the plateau, are found at Tukeit below the Kaieteur, but were not taken lower down.

On the 30th we started down the river. While the Indians were transporting the goods at Waratuk I experimented a while with poison in a little side branch of the cataract. I was so successful that I proposed to make a more systematic attempt at Amatuk, where we stayed for the night. We poisoned above the cataract on an island, but without great success. Below the north branch of the cataract we tried once more on the morning of the 31st. Some of the water loses

itself here under rocks, and we placed the poison above the point where it runs into the rocks. The branch was entirely too large to enable us to kill the fishes, but the poison drove them out from under the rocks so dazed that we could pick them up with our dip-nets.

In all we took forty-two species, of which five were not found elsewhere : 1. *Brachyglanis frenata*, 2. *Brachyglanis phalacra*, 3. *Hemicetopsis minutus*, 4. *Pseudancistrus nigrescens*, 5. *Characidium laterale.* All of these were new.

Here I also secured a series of related little catfishes that were either confined to, or most abundant in, the cataracts of the lower Potaro. These are *Brachyglanis frenata* and *phalacra*, mentioned above; *Myoglanis potaroënsis* and *Chasmocranus longior* and *brevior.* Other *Pimelodinæ, Doradinæ,* and *Auchenipterinæ* were absent. *Lithoxus,* a little loricariid catfish, was very abundant. It is flat and clings to the rock, which is greatly resembles. They were especially abundant in rather deep pools and could only be seen when the poison brought them fluttering to the surface. *Loricaria* was not observed. *Deuterodon pinnatus* and *potaroënsis* were also abundant in the cataract, and *Pœcilurichthys abramoides* and *Æquidens potaroënsis* occurred in a shallow pool near the margin.

Tetragonopterine characins were scarce, but one representative of the *Serrasalminæ* was taken. Of the *Characinæ* there were none. The peculiar *Sternarchorhynchus oxyrhynchus, Porotergus gymnotus,* and *Sternarchus leptorhynchus* were seen here for the first time. They were among the rocks and were driven out by the hiari. The following letter preserves the impressions of this region in their freshness :

Kangaruma, October 30, 1908.

"I think I have written everybody and answered all questions, which need answering, so I may continue my record.

"I awoke before five, and as some of the Indians were stirring I began to sing "balahoo," repeating the word to an old college tune. It has been the reveille and march for the crew ever since we first reached the Kaieteur. I learned several tricks yesterday in poisoning Waratuk that I proposed to put in execution today at Amatuk. We first tried poisoning a little branch above the fall at Amatuk, and got some things. Then we tried a more ambitious scheme of poisoning a big branch below the fall. I found that the poison will drive some fishes out before it kills. We had three men pound hiari and wash it into the branch of the northern part of the fall. William and another Indian stood a long distance below after the water had flowed among and under rocks. I at first stayed near a pool where they were poisoning. Soon *Plecostominæ* began to come up. They were new to me and I dipped with enthusiasm until I fell in. This broke the ice for me, for I then waded from rock to rock, securing eighty-seven specimens of the new genus *Lithoxus.* William came with a dip-net full of fishes, among them long curved-snouted *Gymnotidæ* I had not seen.

"We poisoned and waded, gathering in all half a bucketful of small fishes, all valuable as specimens. It was rare sport, and I did not realize that it was ten o'clock and that I was played out

We had soup, rice, tea, and jam for breakfast, and started at 11:30 on the home-stretch. Dead fishes were floating about the little bay from which we started, so the poison kills.

"Most of the Indians had done nothing but swing in their hammocks all the morning, so they paddled with a swish and swing in great contrast to yesterday's dilly-dallying. At one P.M. we were at Erukin, a sandy, clear creek that I wanted poisoned. We had fished here with poor success at night on the way up. William thought it was too big and swift to poison, but I had them stretch the net across the mouth, sent the pounders up-stream, and William, some other Indians, and myself took up stations at intervals obliquely across the river. I stood in a patch of sunlight where every grain of sand could be seen at the bottom. I was in sleeveless undershirt, pants, and a pair of socks. My tennis-slippers had gone to pieces on the rocks at Amatuk. Soon fishes came down the stream in distress, and when the poison was exhausted, we found we had a number of novelties in our dip-nets and the fifteen-foot net at the mouth of the creek had caught most things as they came down. At 2:30 we were moving again, and when near 4:00 o'clock William cried out "Kangaruma," all paddles stopped for a moment and then dashed on, and we landed here at 4 P.M.[15] I read letters, not all of them thoroughly, till supper time. I must wrap and pack my fishes before we start on our two-and-a-half hours' walk to-morrow, for I don't want to lose the day's catch during the walk.

Saturday morning.

"For about a month now I have not slept out of hearing of the roar of the cataracts. Tumatumari, Kangaruma, Amatuk, Waratuk, Tukeit, Kaieteur, and Holmia are all on cataracts or falls. In fact they are all places where goods have to be transported on account of cataracts. I have so much stuff that it took more than one trip for the twelve carrying Indians that have come down with me. But then their food and personal effects add a little. My personal effects make about one load now. The trip has been a phenomenal one. I can't say that I could swear that I have everything, but every effort, seconded in each case by William and sometimes suggested by him, has been made. I ought to have poisoned the cataract above Holmia, but it rained a night and a day so the river rose five feet, and it could not have been done even if I had at that time learned the trick."

We left Kangaruma in the morning of November 1st for the walk through the woods, and arrived at Potaro Landing in time to catch the boat for Tumatumari. Here I parted with my crew, who returned to Holmia with Mr. Bovallius. I packed fishes and had the fever again. I broke it, and left on the 4th for Crab Falls.

The Potaro Gorge is one of the remarkable features of the world. The river is lined with trees so tall they could only thrive in a region free from strong winds. The sides of the gorge are rugged, and the whole recalls the Rhine, or the Yosemite. We saw no one from the time of striking into the woods behind Potaro Landing till we reached Holmia. The entire stretch is utterly uninhabited and very few tourists pass this way to get the inspiring view of fall and gorge from its upper brink. The region between Savannah Landing and Holmia is level, but mountains

[15] Mr. Macturk had brought a batch of letters from Georgetown and left them here.

can be seen in the distance, toward the south, when the view is not obstructed by trees.

The fauna of the Essequibo becomes attenuated as we go up the Potaro. Its upper course below the fall undoubtedly contains intrusives from the plateau which decrease in number as one gets further and further from the Kaieteur.

At Tumatumari I boarded the launch, taking with me a negro, Mr. Cummings, with a bateau. We landed at the head of an island a short distance below the mouth of the Potaro and just above Crab Falls. There was an Indian settlement here. We slung our hammocks under the shelter of one of their huts. My

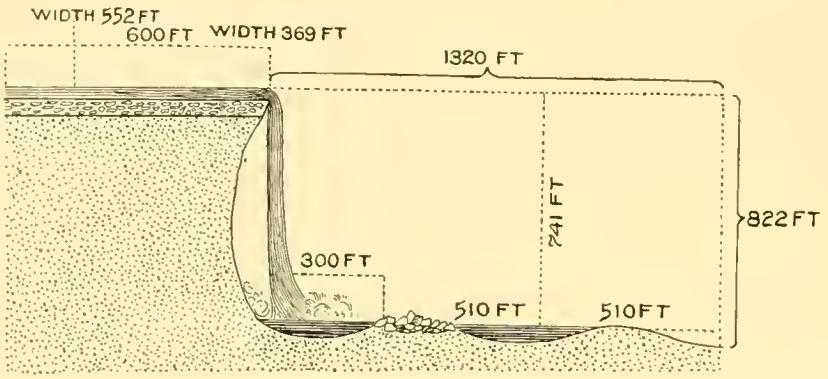

Fig. 22. Diagrammatic representation of the contour of the Kaieteur Falls. (After Brown.)

own hammock, that of Mr. Cummings, and that of an Indian woman radiated from the same center pole, at the base of which a monkey was tied,—a cosmopolitan quartet. Cummings and the Indians went out with the net at night to fish on the sandbanks. I remained in my hammock to recuperate from the fever. On the fifth I sent several of the Indians out to dig hiari roots while I fished about the rocks of Crab Falls. The Essequibo is very wide at this point, divided by an island, and falls over a dike running squarely across the river just after it has made a turn.

On the sixth, Cummings, myself, and four Indians went with the bateau up the Essequibo to shoot pacu at the Warraputa Cataract. Above the mouth of the Potaro the Essequibo is broken by a large number of rocky islets, fragments of a dike crossing the river. Other dikes cross the river further up, the water rushing through the gaps. Through some of the gaps the Indians succeeded in paddling the bateau, through others they dragged the boat after being driven back several times by the current.

A dike extends across the Essequibo near the mouth of the Konawaruk. Opposite the Konawaruk and below the dike there is a lagoon separated from the river by a sandy and partly wooded spit of land, but connected below with the

river. Near the head of the bayou and connected with it by a few inches of water there is a pool toward the river side. It is not more than fifty feet in diameter and perhaps six feet deep in its deepest part. Trees overhang it from the river side. The Indians pounded hiari roots into shreds. They were tied into bundles and two Indians boys swam through the pool with them to mix in the poison. I have described the effect in the introduction. First one species and then another came to the surface, and then they came indiscriminately. A stingaree came fluttering to the surface toward the last, while the little *Corydoras punctatus* withstood the poison to the end. *Catoprion mento*, a Mylinid characin with a projecting chin, was particularly acceptable. The fish that created the greatest interest was *Mœnkhausia dichrourus*, of which I had seen dozens of specimens, hailing from different localities all the way from Paraguay to Para, and all of them conveyed about as much idea of the appearance of the living fish as a dead and plucked Baltimore Oriole would give of the living bird. The base of the tail is bright canary-yellow, the lobes are crossed with jet-black bands and the tips are milk-white.

I do not know how long we stayed here, not over two hours, in which we caught fifty-five different species of fishes, six of which were not secured elsewhere. The uniques were *Bunocephalus amaurus*, *Ochmacanthus flabelliferus*, *Odontostilbe melanditus*, *Aphyodite grammica*, *Hyphessobrycon minor*, *Dormitator gymnocephalus*, all of them new. Several other new or rare things were taken in only one other locality: *Porotergus gymnotus*, *Catoprion mento*, *Hemiodus semitæniatus*.

We continued our row to the Warraputa Cataract. The river is divided here into several branches by wooded islands. The two older Indians started out to shoot pacu, but bagged nothing. The rest of the crew and myself set to work to poison a branch of the cataract, where we were again quite successful, securing a series of specimens that recalled the Amatuk cataract. We also got a series of the young of the pacu, the first which were obtained or recognized as such. The color changes in the young can be seen in plate LIX. After the poisoning Cummings went to the sand-bank to prepare supper, while I browsed about the cataract with the two young Indians.

On my return at dusk I found that no provision had been made for my hammock. The Indians declined to go into the bush at night to secure palm-branches and I did not like to risk a drenching rain so soon after having had the fever. I insisted that the Indians either build me a shelter or take me back to their camp. Giving them an alternative was a mistake. They decided to take me back. It did not rain that night. It was all very well to come up through the gaps in the dikes in the day time. It was quite another matter

to safely guide the bateau down through them at night. We shot through at a tremendous rate and once the boat touched something. The boys shouted with glee, while I came to a sober realization that it would have been better to trust the sky than the rapids. But we got safely back to the huts early in the evening.

On the seventh of November I collected about the rocks just above the fall. Here I succeeded again with hiari in getting fishes which could have been secured in no other way. At one point the bank is piled with huge blocks of stone. To dislodge the fishes from between them would have been impossible in any ordinary way. We pounded some hiari roots and washed them in the swift current that was flowing towards the rocks. At once some species came to the surface, straight up, without attempting to escape. Several species were dislodged including an electric eel. We repeatedly got it into our dip-net, and it as often got out again, without, however, making any coördinated movement to escape from the reach of the net. It proved too slippery, however, to hold in the net, and it got away. When the launch came by from Tumatumari we loaded my effects into it and I left the region of the Potaro and upper Essequibo. I landed at Rockstone in the afternoon and took the train for Wismar the next morning. After packing fishes all day I went to Christianburg as the guest of Messrs. Spence and Brummel. On the ninth I rested at Christianburg. The tenth Mr. Brummel took me to Kumaka, where I made arrangements to have a creek poisoned, and on the morning of the eleventh I took the steamer for Georgetown.

Visiting the markets, preserving and packing fishes, suffering a relapse, recovering from the fever, and enjoying the hospitality of friends at Georgetown consumed the time until sailing for New York. Everything collected arrived at home safely.

Method of Preserving.

The method of preserving the fishes, not one of the twenty-five thousand of which was lost through decay in this tropical region, was as follows:

In the Essequibo and the lowlands all fishes except large catfishes were dropped alive into a can of 25–35 per cent. alcohol in which they were killed. Minute fishes were placed in vials or in small bottles instead of in the tank. Shortly after reaching the camp or home all the fishes above two inches were injected with 95 per cent. alcohol, freed from the coagulated slime, and placed in a can with about 50 per cent. alcohol. The first alcohol, if less than 25 per cent., was thrown away; if more than 25 per cent. it was allowed to stand and was decanted to be used again. A day or two following the catch the specimens were transferred into 75 per cent. alcohol and the larger ones again injected. The following day they were roughly

sorted, wrapped in cheesecloth and dropped into 85–95 per cent. alcohol. As soon as sufficient material was at hand to fill a kerosene can or two, they were filled with fishes packed tight as sardines and the can soldered. A small hole was then punched and the can filled to the top with 95 per cent. alcohol, and again soldered.

Two cans were usually packed in an original kerosene-can box and shipped at once to New York. Some of the cans were punctured and the alcohol leaked out on the way home. The fact that these also brought the fishes through in perfect shape showed that ordinarily greater precautions were taken than necessary.

Because some one who knew nothing of the Indians told me they would steal the alcohol, I took only formalin beyond Tumatumari. I regretted it much, because the precaution was not at all necessary and it would have been better to have had all the sealed fishes preserved in the same manner.

In wrapping the fishes for packing the usual precaution was taken. A locality label was added to each little bundle and the fishes were so wrapped that a layer of thin cheese-cloth was between every two. Care was always taken not to tie the bundles too tightly, and minute delicate things were placed in a small vial after being wrapped Smaller specimens after being wrapped were packed in empty one-pound coffee-tins to keep them from being crushed in the larger kerosene cans.

Naked catfishes in general were preserved in formalin and transferred to alcohol at home. They do not have metallic tints which are dissolved by the formalin, and retain their plumpness better than in alcohol. But the difficulty in opening the jaws and the danger of damaging the fins probably fully discounts for all the gain.

Color notes upon the characins were preserved. It was not possible to do more at the rate I was collecting. The difficulty with *Prochilodus* was mentioned above.

CHAPTER IV.

THE GEOGRAPHICAL DISTRIBUTION OF THE FRESHWATER FISHES OF BRITISH GUIANA.

Every effort was made to secure a complete series of the fishes of the area covered, and reasonable success may be claimed, the ichthyic fauna at large being well represented by the eighteen thousand three hundred odd specimens collected.

Inasmuch as several localities were examined in each of the following districts, (1) the lowlands, (2) the middle Essequibo, (3) the lower Potaro, (4) the upper Potaro, we may also conclude that the faunas of these stretches of territory are well illustrated by the material collected. Furthermore, the work on such units of environment as the trench in the Botanic Garden, the woodland creek and sand-bank at Rockstone, the Konawaruk pool, and the Amatuk Cataract was entirely satisfactory.

On the other hand, it may be doubted whether the lists of specific localities are in many other cases exhaustively complete. I have called attention to this matter in connection with the species taken at Rockstone and nowhere else. It was found that many of these are known to have a wide distribution and must occur in other localities in the area under consideration, although they were not taken elsewhere.

Furthermore, it must be regretted that time did not permit me to make a more exhaustive study of the fauna in the Potaro between Amatuk and Tukeit and above the Kaieteur.

General Plans for Distributional Work.

A question of greater interest to the next expedition than to the general account of the present trip is the length of time that should, and could to advantage, be given to any one place, and how far apart stations should be selected. To graphically demonstrate conclusions I have prepared two tables.

On p. 84 is a summary showing the total number of species taken at each place, and on p. 85 a summary of the number of species taken at but one locality. The latter shows how much would have been lost from the total number of species, had any particular locality been skipped. Only Kangaruma yielded nothing new, and fishing here was but a minor incident. There is very great inequality. The omission of Konawaruk, where two hours were spent, would have entailed nearly as

great a loss as the omission of Tumatumari, where a week was devoted to fishing. Amatuk also, where fishing was attempted twice in passing up and down the Potaro, yielded a large number of unique species.

At Konawaruk we stopped for only about two hours on our way up the Essequibo. Our success here is chargeable altogether to the fact that *everything* was gathered that was contained in a small sand- and mud-lined pool. A week's stay would not have yielded more. No doubt the list for this locality would have been vastly increased if we had as thoroughly cleaned out one of the rapids, a sand-beach, a fallen tree-top, a woodland brook, a rock-lined pool, the channel, etc. As far as possible one of each of such different units should be *exhaustively* fished at each locality if the limits of the distribution of species is sought. Superficial fishing yields only the ordinary, the cream is obtained by stripping. The length of time that should be devoted to any one locality depends, therefore, on the variety of units to be found at one place. Rockstone shows a larger number of species in the preceding lists because a greater variety of units were examined. Further collecting at this place would have been profitable.

Again, to determine the limits of the distribution of species, localities should be no more than twenty-five miles apart in a stream like the Essequibo or lower Potaro. The distance between stations should of course be much less where the stream is descending rapidly. It may be greater if the largest number of species in the shortest time is the object. Rockstone and Crab Falls are about forty-five miles apart in a straight line. Sixteen species taken at Crab Falls were not taken at Rockstone or below Rockstone. Their downward limit was therefore not determined. About twenty species taken at Rockstone do not extend as far as Crab Falls, and their upward limit was therefore not determined. It is doubtful whether anything else of consequence was missed, because the stations were so far apart. Over twenty-five species taken at Rockstone were not seen at Crab Falls, but must occur there, for they were taken farther up the stream, a fact which again demonstrates the necessity of exhaustive work.

The general recommendation for future work is, then, that representative localities be selected twenty-five to fifty miles apart, and that collecting be done exhaustively in each sort of environment to be found at each locality. A week at the least in each locality should be the minimum time-allowance. On a large river like the Amazon a month or more would be required in a favorable season to secure a representative collection from any one point (In an unfavorable season it would not be worth while to attempt fishing.) Such collecting could advantageously be supplemented by exhaustive collecting in isolated favorable units. Here the time requirements would be much less.

The Ichthyological Position of British Guiana.

In the Reports of the Princeton University Expedition to Patagonia, Vol. III, I discuss, among other things, the distribution of the fishes in the Americas south of the tropic of Cancer. Five distinct regions of unequal value are recognized: (1) Transition, (2) Mexican, (3) Brazilian, (4) Andean, and (5) Patagonian.

In the Brazilian region the following "provinces" were enumerated: (1) Central America, (2) Pacific, (3) Magdalena, (4) Amazon, (5) Guiana, (6) Trinidad, (7)[16] San Francisco, (8) Coastal, (9) La Plata, the latter divided into the Paraguay and Parana-La Plata.

Concerning the Guiana Province, including French, Dutch, British, and Venezuelan Guiana, the following is said (p. 319):

"The Guiana Province, including one of the oldest land-masses, is drained by the Cachipur, Oyapoc, Cayenne, Mana, Maroni, Surinam, Corentine, Essequibo (Mazaruni, Cuyuni, Rupununi and other tributaries of the Essequibo), Demerara, Berbice, by the Orinoco and its eastern and southern tributaries, the Caroni, Caura, Ventuari, and by the Rio Branco, and the northern tributaries of the Amazon east of the Branco.

"The feature distinguishing this region is the known or reported connection between neighboring streams. The Cassiquiari connects the Orinoco with the Rio Negro. The Atabapo is said during the rainy season to be connected with the Guaina, and the Rupununi of the Essequibo basin with the Tacutu of the Rio Branco basin. It is said that the Essequibo is also connected with the Rio Trombetas through the Apini and the Oyapoc, Cachipur, and Araguary with the tributaries of the Yari, which empties into the Amazon.

"The lower course of the Essequibo of British Guiana at least is connected with the lower Orinoco by natural canals, so that these form part of the Orinoco-Amazon-La Plata meshwork and contain the same types. The Eastern Guianas (French) have a less varied fauna.

"The fauna of this region is of the greatest importance to theoretical chorology, since this is one of the two old land-masses, and since it was by a continuation of this area that South America is supposed to have been connected with Africa.

"Our knowledge of the fish fauna of this region is derived from Müller & Troschel's account of the fishes of British Guiana; Bleeker's Silure de Surinam; Vaillant's notes on the fishes of French Guiana, and his account of the Berbice and the general work of Cuvier & Valenciennes, Günther, Eigenmann & Eigenmann, Regan and Pellegrin.

[16] "East Brazilian Plateau," comprising 7 and 8, was given a separate heading in the paper quoted.

"Unfortunately little is known of the fauna of the streams of the table land of Guiana, the region where the remnant of the original fauna may be expected to persist. Schomburgk's collections made in those streams were largely lost. He states that it was rich in species (over 30).

"Andre ('A Naturalist in the Guianas,' p. 205) says: 'In fact the falls of Para [of the Caura] appear to constitute an effective barrier between distinct forms of river life', and that the fauna above the falls is different from that below.

"The most promising field for scientific results, if not number of species, seems to me to be offered by the rivers of this region, which should be explored *above* and *below* falls that are impassable barriers for the ascent of fishes.

"The rivers of this region, exclusive of the northern tributaries of the Amazon, concerning which not much is known, contain a total of about 298 recorded species. Of these about 60 per cent. are also found in the Amazon; as of these about 16 species are from the Rio Branco basin and not from the other streams and the Rio Branco belongs to the Amazon system, this number must be reduced by 16, which still leaves over 50 per cent. of the fauna identical with that of the Amazon."

The following table is derived from the one succeeding the above quotation. It is condensed laterally by including the tributaries of the Branco and the rivers of French and Dutch Guiana in one column each, and is expanded vertically by adding the species discovered by me.

It will especially show the relation of the fauna of the Essequibo to that of adjoining regions. Columns 1, 2, 5, 8, 9 and 10 offer an opportunity for a comparison of the lowland faunas from west to east, *i. e.*, of the Orinoco, Barima, lower Essequibo, Demerara-Mahaica, Surinam, and French Guiana. Columns 3, 4, 5, 6 and 7 offer an opportunity for a comparison of the fauna of the Lower Essequibo (5) from its mouth to the Warraputa Cataracts with that of the Upper Essequibo and its tributary the Rupununi (4) and with that of the lower Potaro (6) and upper Potaro (7), and also the Rio Branco (3) with its tributaries, the Ireng, *et al.* The details of the distribution of the British Guiana species are taken up later. Those species found also in the Amazon are preceded by an A. Those species preceded by an L are also found in the La Plata system. Those peculiar to the Guianas are marked with an *, and the genera peculiar to the region are marked with a double **. The estuarine species are preceded by an M.

In the following table column 1 represents the Orinoco basin, 2 the streams emptying between the Orinoco and the Essequibo, 3 the Rio Branco basin, Takutu, Ireng *et al.*, 4 the upper Essequibo with the Rupununi, 5 the Essequibo below Warraputa, 6 the lower Potaro, 7 the upper Potaro, 8 the Demerara, 9 Dutch Guiana, especially Surinam, and 10 French Guiana.

			Orinoco Basin.	West Coast of British Guiana.	Rio Branco Basin.	Rupununi.	Lower Essequibo.	Lower Potaro.	Upper Potaro.	Demerara.	Dutch Guiana.	French Guiana.
			1	2	3	4	5	6	7	8	9	10
1.	A *	*Paratrygon strongylopterus* (Schomburgk)			×	×						
2.	A L	*Potamotrygon hystrix* (Müller and Henle)	×		×	×	×					
3.	*	*Potamotrygon d'orbignyi* (Castelnau)	×									
4.	A	*Potamotrygon reticulatus* (Günther)									×	
5.	A L	*Potamotrygon motoro* (Müller and Henle)			×							
6.	A	*Elipesurus spinicauda* (Schomburgk)			×							
7.	A	*Platystacus cotylephorus* (Bloch)									×	
8.	*	*Platystacus nematophorus* Bleeker									×	
9.	*	*Chamaigenes filamentosus* (Cuv. and Valenciennes)								×		×
10.	A	*Aspredinichthys tibicen* (Temminck)								×	×	
11.	A	*Aspredo aspredo* (Linnæus)		×						×	×	×
12.	*	*Aspredo sicuephorus* (Cuvier and Valenciennes)								×		
13.	A	*Bunocephalus gronovii* Bleeker								×		
14.	*	*Bunocephalus amaurus* Eigenmann					×					
15.	*	*Bunocephalus chamaizelus* Eigenmann					×	×				
16.	*	*Agmus lyriformis* Eigenmann				×	×					
17.	A *	*Bunocephalichthys hypsiurus* (Kner)			×							
18.	M	*Felichthys bagre* (Linnæus)		×		×				×	×	×
19.	M	*Felichthys marinus* (Mitchell)	×							×	×	
20.	M	*Sciadeichthys flavescens* (Cuv. and Valenciennes)								×		
21.	M	*Sciadeichthys temminckianus* (Cuv. and Val.)										×
22.	M	*Sciadeichthys emphysetus* (Müller and Troschel)								×	×	
23.	M	*Sciadeichthys proöps* (Cuvier and Valenciennes)								×	×	
24.	M	*Sciadeichthys luniscutis* (Cuvier and Valenciennes)									×	
25.	M	*Sciadeichthys albicans* (Cuvier and Valenciennes)										×
26.	M	*Sciadeichthys parkeri* (Traill)								×	×	×
27.	M	*Selenaspis herzbergi* (Bloch)								×	×	×
28.	M	*Selenaspis passany* (Cuvier and Valenciennes)								×		×
29.	M	*Notarius grandicassis* (Cuvier and Valenciennes)								×		
30.	M	*Notarius parmocassis* (Cuvier and Valenciennes)								×		
31.	M	*Notarius stricticassis* (Cuvier and Valenciennes)								×	×	×
32.	M	*Hexanematichthys surinamensis* Bleeker									×	
33.	M	*Hexanematichthys rugispinis* (Cuv. and Val.)								×		×
34.	M	*Hexanematichthys phrygiatus* (Cuv. and Val.)										×
35.	M	*Arius spixi* Agassiz								×	×	×
36.	M	*Arius fissus* (Cuvier and Valenciennes)									×	×
37.	M	*Arius variolanus* (Cuvier and Valenciennes)										×
38.	A	*Callophysus macropterus* (Lichtenstein)					×					
39.	A L	*Luciopimelodus pati* (Valenciennes)			×							
40.	* *	*Megalonema platycephalum* Eigenmann					×	×				
41.	A	*Pirinampus pirinampu* (Agassiz)					×					
42.?	A L	*Zungaro zungaro* (Humboldt)										×
43.	*	*Microglanis pœcilus* Eigenmann				×						
44.	A	*Pseudopimelodus raninus* (Cuv. and Valenciennes)	×				×					
45.	*	*Pseudopimelodus villosus* Eigenmann						×				
46.	*	*Pseudopimelodus albomarginatus* Eigenmann						×				
47.	*	*Brachyglanis frenata* Eigenmann						×				
48.	*	*Brachyglanis melas* Eigenmann					×			×		
49.	*	*Brachyglanis phalacra* Eigenmann						×				
50.	* *	*Leptoglanis essequibensis* Eigenmann					×					
51.	* *	*Myoglanis potaroënsis* Eigenmann						×				
52.	* *	*Chasmocranus longior* Eigenmann					×	×				
53.	*	*Chasmocranus brevior* Eigenmann						×				
54.	A L	*Heptapterus mustelinus* (Valenciennes)										×
55.	*	*Acentronichthys surinamensis* Bleeker									×	

			Orinoco Basin.	West Coast of British Guiana.	Rio Branco Basin.	Rupununi.	Lower Essequibo.	Lower Potaro.	Upper Potaro.	Demerara.	Dutch Guiana.	French Guiana.
			1	2	3	4	5	6	7	8	9	10
56.	*	*Rhamdia laukidi* Bleeker									?	
57.	A	*Rhamdia schomburgki* Bleeker									?	
58.	A	*Rhamdia sebæ* (Cuvier and Valenciennes)		×			×					×
59.	A	*Rhamdia quelen* (Quoy and Gaimard)			×			×	×			
60.	*	*Rhamdia holomelas* (Günther)					×			×		
61.	*	*Rhamdia arekaima* (Schomburgk)				×	×					
62.	A	*Rhamdia multiradiatus* (Kner)			×							
63.	*	*Rhamdella foina* (Müller and Troschel)					×					
64.	A *	*Rhamdella notata* (Schomburgk)			×							
65.	A	*Pimelodella cristata* (Müller and Troschel)					×	×				
66.	*	*Pimelodella megalops* Eigenmann					×	×				
67.	*	*Pimelodella macturki* Eigenmann		×						×		
68.	A L	*Pimelodella gracilis* (Valenciennes)	×									×
69.	A L	*Pimelodus clarias* (Bloch)	×	×		×	×	×		×	×	×
70.	A L	*Pimelodus ornatus* Kner		×			×	×				
71.	*	*Pimelodus heteropleurus* Eigenmann				×						
72.	A	*Pimelodus altipinnis* Steindachner								×		
73.	A	*Galeichthys caques* (Müller and Troschel)				×	×					
74.	A	*Platynematichthys punctulatus* (Kner)			×							
75.	A	*Phractocephalus hemiliopterus* (Bloch and Schn.)					?			×		
76.	A	*Brachyplatystoma vaillanti* (Cuvier and Val.)	×			×	×			×	×	×
77.	A L	*Hemisorubim platyrhynchos* (Cuvier and Val.)	×			×						
78.	A	*Pseudoplatystoma fasciatum* (Linnæus)	×			×				×	×	
79.	? A	*Pseudoplatystoma tigrinum* (Cuvier and Val.)					?					
80.	A L	*Sorubim lima* (Bloch and Schneider)	×		×							
81.	A L	*Sorubimichthys planiceps* (Agassiz)	×		×							
82.	A L	*Doras granulosus* Valenciennes										?
83.	A	*Doras dorsalis* Cuvier and Valenciennes			×							×
84.	*	*Doras albomaculatus* Peters	×									
85.	*	*Doras helicophilus* Günther									×	
86.	*	*Doras dentatus* Kner									×	
87.	*	*Doras hancocki* (Cuvier and Valenciennes)				×	×	×		×		
88.	A L	*Doras armatus* (Cuvier and Valenciennes)	×									?
89.	A	*Doras cataphractus* (Linnæus)					×	×		×	×	
90.	A	*Doras affinis* Kner			×							
91.	A *	*Doras castaneo-ventris* Schomburgk			×							
92.	A	*Oxydoras niger* (Valenciennes)				×						
93.	*	*Leptodoras linnelli* Eigenmann					×	×				
94.	*	*Hemidoras microstomus* Eigenmann					×					
95.	A	*Hemidoras carinatus* Linnæus					×	×		×	×	×
96.	*	*Hemidoras micropæus* Eigenmann								×		
97.	*	*Hemidoras leporhinus* Eigenmann						×				
98.	*	*Hemidoras notospilus* Eigenmann					×					
99.	A L	*Trachelyopterus coriaceus* Cuvier and Valenciennes										×
100.	A *	*Centromochlus oneinus* Schomburgk			×							
101.	A	*Centromochlus heckeli* Philippi	×									
102.	? A	*Centromochlus perugiæ* Steindachner?										
103.	A	*Centromochlus oulopygius* Kner	×				×	×		×		
104.	*	*Trachycorystes glaber* Steindachner								×		
105.	*	*Trachycorystes obscurus* (Günther)					×					
106.	A	*Trachycorystes ceratophysus* (Kner)			×							
107.	A L	*Trachycorystes galeatus* (Linnæus)	×	×	×					×		
108.	A	*Pseudauchenipterus nodosus* (Bloch)								×	×	
109.	A	*Auchenipterus nuchalis* (Spix)									×	×
110.	*	*Auchenipterus demeraræ* Eigenmann								×		

			Orinoco Basin. 1	West Coast of British Guiana. 2	Rio Branco Basin. 3	Rupununi. 4	Lower Essequibo. 5	Lower Potaro. 6	Upper Potaro. 7	Demerara. 8	Dutch Guiana. 9	French Guiana. 10
111.	*	*Auchenipterus brevior* Eigenmann						×				
112.	*	*Tympanopleura pipcratus* Eigenmann					×					
113.	*	*Ageneiosus guianensis* Eigenmann								×		
114.	*	*Ageneiosus marmoratus* Eigenmann						×				
115.	*	*Ageneiosus inermis* (Linnæus)									×	
116.	*	*Ageneiosus armatus* Lacépède									×	
117.	A	*Ageneiosus dentatus* Kner									×	
118.	*	*Ageneiosus porphyreus* Cope									×	
119.	A L	*Ageneiosus brevifilis* Cuvier and Valenciennes				×				×	×	
120.	*	*Ageneiosus axillaris* Günther									×	
121.	*	*Helogenes marmoratus* Günther					×	×	×	×		
122.	A	*Hypophthalmus edentatus* Spix			×		×			×	×	×
123.	A	*Cetopsis cæcutiens* (Lichtenstein)	×									
124.	*	*Hemicetopsis macilentus* Eigenmann						×				
125.	*	*Hemicetopsis minutus* Eigenmann						×				
126.	*	*Pygidium guianense* Eigenmann							×			
127.	*	*Pygidium gracilior* Eigenmann						×				
128.	*	*Pygidium conradi* Eigenmann						×				
129.	?	*Pygidium tænia* (Kner).[16]										×
130.	*	*Ochmacanthus flabelliferus* Eigenmann					×					
131.	A	*Vandellia plazaii* Castelnau	×									
132.	A L	*Callichthys callichthys* (Linnæus)	×		×	×	×	×	×	×	×	×
133.	A L	*Hoplosternum littorale* (Hancock)	×							×	×	×
134.	A	*Hoplosternum thoracatum* (Cuv. and Valenciennes)	×	×	×	×	×			×	×	×
135.	A	*Corydoras punctatus* (Bloch)				×	×	×		×	×	
136.	A L	*Plecostomus plecostomus* (Linnæus)			×					×	×	×
137.	*	*Plecostomus hemiurus* Eigenmann			?		×	×				
138.	A	*Plecostomus verres* (Cuvier and Valenciennes)								×		×
139.	A	*Plecostomus emarginatus* (Cuv. and Valenciennes)		×	×		×					
140.	* *	*Lithogenes villosus* Eigenmann							×			
141.	* *	*Corymbophanes andersoni* Eigenmann							×			
142.	A L	*Cochliodon cochliodon* (Kner)	×									
143.	*	*Hemiancistrus schomburgki* (Günther)					?					
144.	*	*Hemiancistrus megacephalus* (Günther)					×	×				
145.	*	*Hemiancistrus medians* (Kner)									×	
146.	A *	*Hemiancistrus braueri* Eigenmann			×							
147.	A L	*Pterygoplichthys multiradiatus* (Hancock)								×		
148.	L	*Pseudancistrus barbatus* (Cuv. and Valenciennes)					×				×	×
149.	*	*Pseudancistrus depressus* (Günther)									×	
150.	*	*Pseudancistrus guentheri* (Regan).[17]									×	
151.	*	*Pseudancistrus nigrescens* Eigenmann						×				
152.	A L	*Xenocara gymnorhynchus* Kner			×		×					
153.	F	*Ancistrus dolichopterus* (Kner)			×						×	×
154.	A *	*Ancistrus temminckii* (Cuvier and Valenciennes)			×	×	×				×	×
155.	A L	*Ancistrus hoplogenys* (Günther)				×	×					
156.	A L	*Ancistrus cirrhosus* (Valenciennes)			×		×					
157.	*	*Ancistrus lithurgicus* Eigenmann					×					
158.	* *	*Lithoxus lithoides* Eigenmann						×				
159.	*	*Pseudacanthicus serratus* (Cuv. and Valenciennes)									×	
160.	*	*Pseudacanthicus fordi* Günther									×	
161.	A	*Acanthicus hystrix* Spix			×							
162.	A L	*Loricaria cataphracta* (Linnæus)	×	×		×	×			×	×	×
163.	M	*Loricariichthys filamentosus* (Steindachner)									×	

[16] It is very doubtful whether the specimen recorded is the *tænia* of Kner.
[17] British Guiana.

			Orinoco Basin.	West Coast of British Guiana.	Rio Branco Basin.	Rupununi.	Lower Essequibo.	Lower Potaro.	Upper Potaro.	Demerara.	Dutch Guiana.	French Guiana.
			1	2	3	4	5	6	7	8	9	10
164.	A	*Loricariichthys maculatus* (Bloch)		×							×	
165.	A L	*Loricariichthys typus* (Bleeker)									×	
166.	*	*Loricariichthys microdon* (Eigenmann)				×						
167.	*	*Loricariichthys griscus* (Eigenmann)					×					
168.	*	*Loricariichthys brunneus* (Hancock)				×	×	×		×		
169.	A	*Loricariichthys platyurus* (Müller and Troschel)				×		×				
170.	A *	*Loricariichthys stewarti* (Eigenmann)			×							
171.	A L	*Hemiodontichthys acipenserinus* (Kner)					×					
172.	*	*Harttia platystoma* (Günther)					×				×	
173.	A	*Neoplecostomus granosus* (Cuv. and Valenciennes)										×
174.	*	*Farlowella hargreavesi* Eigenmann					×					
175.	* *	*Bivibranchia protractila* Eigenmann					×					
176.	A	*Curimatopsis macrolepis* Steindachner					×			×		
177.	A L	*Curimatella alburna* (Müller and Troschel)	×		×	×						
178.	A	*Curimatus spilurus* Günther				×	×	×		×		
179.	*	*Curimatus microcephalus* Eigenmann and Eigenm.		×			×	×				
180.	*	*Curimatus morawhannæ* Eigenmann		×								
181.	*	*Curimatus issororocnsis* Eigenmann		×								
182.	A	*Curimatus kneri* Steindachner			×						×	
183.	A	*Curimatus cyprinoides* (Linnæus)									×	×
184.	*	*Curimatus schomburgki* Günther		×						×	×	
185.	A	*Curimatus ciliatus* Müller and Troschel				×	×					
186.	*	*Eigenmannina orinocensis* (Steindachner)	×									
187.	A	*Semitapicis latior* (Spix)									×	
188.	A	*Prochilodus rubrotæniatus* Schomburgk			×		×	×				
189.	A	*Prochilodus maripicru* Eigenmann			×							
190.	A	*Prochilodus insignis* Schomburgk			×							
191.	A	*Prochilodus binotatus* Schomburgk			×							
192.	*	*Prochilodus laticeps* Steindachner	×									
193.	A	*Prochilodus brama* (Cuvier and Valenciennes)	×									
194.	A	*Cænotropus labyrinthicus* (Kner)	×		×							
195.	* *	*Tylobronchus maculosus* Eigenmann					×	×			×	
196.	* *	*Chilodus punctatus* Müller and Troschel						×				
197.	A *	*Parodon bifasciatus* Eigenmann			×							
198.	A	*Hemiodus semitæniatus* Kner										×
199.	A	*Hemiodus immaculatus* Kner	×									
200.	*	*Hemiodus quadrimaculatus* Pellegrin										×
201.	*	*Hemiodus maculofasciata* Eigenmann						×				
202.	*	*Anisitsia keppleri* (Günther)									×	
203.	A	*Anisitsia notata* (Schomburgk)					×	×		×	×	
204.	*	*Piabucina unitæniata* Günther						?				
205.	*	*Pyrrhulina filamentosa* Cuvier and Valenciennes		×		×	×	×	×	×	×	×
206.	*	*Nannostomus beckfordi* Günther								×		
207.	*	*Nannostomus marginatus* Eigenmann					×			×		
208.	*	*Nannostomus minimus* Eigenmann						×				
209.	*	*Nannostomus simplex* Eigenmann								×		
210.	*	*Pœcilobrycon harrisoni* Eigenmann								×		
211.	A	*Pœcilobrycon trifasciatus* Steindachner					×					
212.	*	*Pœcilobrycon erythrurus* Eigenmann					×	×				
213.	*	*Pœcilobrycon ocellatus* Eigenmann				×	×	×		×		
214.	**	*Archicheir minutus* Eigenmann								×		
215.	*	*Characidium laterale* Eigenmann						×				
216.	*	*Characidium vintoni* Eigenmann						×				
217.	*	*Characidium blennioides* Eigenmann					×	×				
218.	A L	*Characidium fasciatum* Reinhardt	×		×							

			Orinoco Basin	West Coast of British Guiana.	Rio Branco Basin	Rupununi.	Lower Essequibo.	Lower Potaro.	Upper Potaro.	Demerara.	Dutch Guiana.	French Guiana.
			1	2	3	4	5	6	7	8	9	10
219.	*	*Characidium pellucidum* Eigenmann					×					
220.	*	*Characidium pteroides* Eigenmann					×			×		
221.	*	*Characidium catenatum* Eigenmann					×					
222.	A	*Anostomus anostomus* (Linnæus)					×	×				
223.	A	*Anostomus trimaculatus* Kner				×	×					
224.	*	*Anostomus plicatus* Eigenmann					×	×				
225.	*	*Anostomus orinocensis* Steindachner	×									
226.	A L	*Schizodon fasciatus*, Spix			×	×		×		×		
227.	*	*Schizodontopsis laticeps* Eigenmann					×					
228.	A L	*Leporinus striatus* Kner	×									
229.	*	*Leporinus areus* Eigenmann						×				
230.	A	*Leporinus nigrotæniatus* (Schomburgk)		×	×		×	×				
231.	A	*Leporinus muelleri* Steindachner	×									
232.	A L	*Leporinus friderici* (Bloch)	×	×	×		×	×		×	×	
233.	A *	*Leporinus maculatus* Müller and Troschel			×	×	×	×				×
234.	A *	*Leporinus granti* Eigenmann			×							
235.	*	*Leporinus alternus* Eigenmann					×	×				
236.	A L	*Leporinus affinis* Günther	×									
237.	A L	*Leporinus hypselonotus* Günther	×									
238.	A L	*Leporinus fasciatus* (Bloch)	×				×	×			×	
239.	A	*Crenuchus spilurus* Günther		×		×	×			×		
240.	* *	*Pœilocharax bovallii* Eigenmann						×	×			
241.	*	*Odontostilbe melondetus* Eigenmann					?					
242.	*	*Aphyocharax melanotus* Eigenmann					×					
243.	A *	*Aphyocharax erythrurus* Eigenmann			×		×					
244.	* *	*Aphyodite grammica* Eigenmann					×					
245.	A	*Iguanodectes tenuis* Cope				×	×	×				
246.	A	*Piabucus dentatus* Kœlreuter		×	×					×		
247.	*	*Agoniates halecinus* Müller and Troschel					×					
248.	* *	*Scissor macrocephalus* Günther									×	
249.	A L	*Tetragonopterus argenteus* Cuvier	×		×			×				
250.	A L	*Tetragonopterus chalceus* Agassiz	×				×	×		×	×	×
251.	A	*Mænkhausia oligolepis* (Günther)			×			×	×			
252.	*	*Mænkhausia profunda* Eigenmann		×								
253.	A	*Mænkhausia grandisquamis* (Müller and Troschel)					×	×		×		
254.	A	*Mænkhausia chrysargyrea* (Günther)				×	×	×		×		
255.		*Mænkhausia ovalis* (Günther)[18]										
256.	*	*Mænkhausia browni* Eigenmann						×	×			
257.	A	*Mænkhausia megalops* Eigenmann					×					
258.	*	*Mænkhausia shideleri* Eigenmann					×	×				
259.	A L	*Mænkhausia dichrourus* (Kner)					×	×				
260.	A	*Mænkhausia lepidurus* (Kner)					×	×		×		×
261.	A	*Mænkhausia cotinho* Eigenmann					×	×		×		
262.	A	*Mænkhausia colletti* (Steindachner)				×	×	×		×		
263.	A	*Mænkhausia copei* (Steindachner)				×	×			×		
264.	*	*Pristella riddlei* (Meek)	×							×		
265.	*	*Pristella aubynei* Eigenmann								×		
266.	A	*Hemigrammus unilineatus* Gill	×	×						×		
267.	*	*Hemigrammus erythrozonus* Durbin		×				×		×		
268.	*	*Hemigrammus rodwayi* Durbin								×		
269.	A	*Hemigrammus ocellifer* Steindachner					×			×		
270.	*	*Hemigrammus iota* Durbin					×					
271.	*	*Hemigrammus orthus* Durbin				×		×				
272.	*	*Hemigrammus cylindricus* Durbin					×	×				

[18] British Guiana.

			Orinoco Basin.	West Coast of British Guiana.	Rio Branco Basin.	Rupununi.	Lower Essequibo.	Lower Potaro.	Upper Potaro.	Demerara.	Dutch Guiana.	French Guiana.
			1	2	3	4	5	6	7	8	9	10
273.	*	*Hemigrammus micropterus* Meek	×									
274.	*	*Hyphessobrycon minor* Durbin					×					
275.	*	*Hyphessobrycon rosaceus* Durbin					×					
276.	*	*Hyphessobrycon riddlei* Meek					×					
277.	A	*Hyphessobrycon gracilis* Reinhardt					×					
278.	*	*Hyphessobrycon minimus* Durbin								×		
279.	*	*Hyphessobrycon eos* Durbin						×				
280.	*	*Hyphessobrycon stictus* Durbin								×		
281.	A	*Hyphessobrycon belotti* (Steindachner)	×									
282.	**	*Dermatocheir catablepta* Durbin						×				
283.	A	*Creatochanes affinis* Günther			×	×	×	×	×	×		×
284.	*	*Creatochanes melanurus* (Bloch)								×	×	
285.	*	*Creatochanes caudomaculatus* Günther		×			×	×		×		
286.	*	*Creagrutus melanzonus* Eigenmann					×	×				
287.	*	*Bryconamericus hyphesson* Eigenmann						×				
288.	*	*Astyanax guianensis* Eigenmann					×	×				
289.	*	*Astyanax essequibensis* Eigenmann					×	×				
290.	*	*Astyanax mutator* Eigenmann						×				
291.	*	*Astyanax mucronatus* Eigenmann						×				
292.	*	*Astyanax wappi* (Cuvier and Valenciennes)					?					
293.	*	*Pœcilurichthys polylepis* (Günther)					×	×		×		
294.	*	*Pœcilurichthys abramoides* Eigenmann					×	×				
295.	A L	*Pœcilurichthys bimaculatus* (Linnæus)	×	×	×	×		?	×	×	×	×
296.	A L	*Pœcilurichthys abramis* (Jenyns)	×									
297.	*	*Pœcilurichthys potaroensis* Eigenmann						×				
298.	*	*Ctenobrycon spilurus* (Cuvier and Valenciennes)								×	×	
299.	A	*Ctenobrycon hauxwellianus* (Cope)	×									
300.	*	*Deuterodon potaroensis* Eigenmann						×				
301.	*	*Deuterodon pinnatus* Eigenmann					×	×				
302.	*	*Phenacogaster megalostictus* Eigenmann					×	×				
303.	*	*Phenacogaster microstictus* Eigenmann					×	×				
304.	A	*Holobrycon pesu* (Müller and Troschel)					×	×		×		
305.	*	*Brycon longiceps* Steindachner	×									
306.	*	*Brycon siebenthali* Eigenmann					×					
307.	*	*Brycon falcatus* Müller and Troschel					×	×			×	
308.	A *	*Bryeon lucidus* (Kner)			×							
309.	A	*Chalceus macrolepidotus* Cuvier					×	×				
310.	A	*Fowlerina orbicularis* (Cuvier and Valenciennes)					×	×		×		
311.	*	*Poptella longipinnis* (Popta)									×	
312.	A L	*Chalcinus angulatus* Spix	×									
313.	A	*Chalcinus rotundatus* (Schomburgk)					×			×		
314.	A	*Chalcinus elongatus* Günther		×								
315.	A	*Carnegiella strigata* (Günther)				×	×	×		×		
316.	A	*Gasteropelecus sternicla* Linnæus		×			×	×		×	×	
317.	L A	*Thoracocharax stellatus* (Kner)	×									
318.	A L	*Serrasalmo gymnogenys* Günther	×			×	×	×		×		
319.	F L	*Serrasalmo marginatus* Valenciennes	×									
320.	A L	*Serrasalmo spilopleura* Kner				×	×					
321.	A *	*Serrasalmo rhombeus* (Linnæus)			×	×	×	×		×	×	
322.	*	*Pygocentrus stagnatilis* (Schomburgk)				×						
323.	A *	*Pygocentrus niger* (Schomburgk)				?				?		
324.	A L	*Pygocentrus piraya* (Cuvier)			×	×				×		
325.	A	*Pygocentrus scapularis* (Günther)	×			×				×		
326.	A L	*Pygocentrus nattereri* (Kner)	?									
327.	*	*Pygocentrus bilineatus* Eigenmann		×								

			Orinoco Basin. 1	West Coast of British Guiana. 2	Rio Branco Basin. 3	Rupununi. 4	Lower Essequibo. 5	Lower Potaro. 6	Upper Potaro. 7	Demerara. 8	Dutch Guiana. 9	French Guiana. 10
328.	A	*Pygopristis denticulatus* (Cuvier)			×	×	×			×		
329.	A	*Catoprion mento* (Cuvier)			×		×					
330.	A	*Mylesinus schomburgki* Cuvier and Valenciennes										
331.	A	*Acnodon oligocanthus* (Müller and Troschel)								×	×	
332.	A	*Piaractus macropomus* (Cuvier)	×									
333.	A	*Metynnis hypsauchen* (Müller and Troschel)			×		×					
334.	A	*Metynnis maculatus* (Kner)				×				×	×	×
335.	A	*Myleus pacu* (Schomburgk)					×					×
336.	A	*Myloplus schomburgki* (Jardine)	×		×	×					×	
337.	A	*Myloplus torquatus* (Kner)			×							
338.	*	*Myloplus knері* (Steindachner)									×	
339.	A	*Myloplus discoidcus* (Kner)			×							
340.	*	*Myloplus rubripinnis* (Müller and Troschel)					×	×		×		
341.	L *	*Myloplus asterias* (Müller and Troschel)					×	×		×		
342.	A	*Myloplus rhomboidalis* (Cuvier)					×	×			×	×
343.	A L	*Mylosoma aureum* (Spix)	×		×							
344.	A	*Cynodon gibbus* Spix			×		×			×		
345.	A L	*Rhaphiodon vulpinus* Spix	×									
346.	A	*Hydrolicus scomberoides* (Cuvier)	×				×					
347.	A	*Exodon paradoxus* (Müller and Troschel)			×	×	×					
348.	A	*Raboides affinis* Günther	×									
349.	*	*Raboides thurni* Eigenmann				×						
350.	R	*Raboides microlepis* (Reinhardt)	×									
351.	A L	*Charax gibbosus* (Gronow)		×	×		×	×		×	×	
352.	*	*Charax rupununi* Eigenmann				×						
353.	* *	*Asiphonichthys hemigrammus* Eigenmann					×					
354.	*	*Cynopotamus essequibensis* Eigenmann					×	×				
355.	A	*Cynopotamus humeralis* Valenciennes	×									
356.	* *	*Acanthocharax microlepis* Eigenmann					×	×				
357.	* *	*Heterocharax macrolepis* Eigenmann					×			×		
358.	A L	*Salminus hilarii* Cuvier and Valenciennes	×									
359.	A	*Acestrorhynchus falcatus* (Bloch)		×		×	×	×		×	×	×
360.	A	*Acestrorhynchus microlepis* (Schomburgk)		×	×		×	×		×		
361.	A	*Acestrorhynchus falcirostris* (Cuvier)				×	×			×		
362.	*	*Acestrorhynchus nasutus* Eigenmann					×					
363.	A	*Hydrocynnus cuvieri* (Agassiz)	×		×	×	×					
364.	A L	*Hoplias malabaricus* (Bloch)	×	×	×	×	×	×	×	×	×	×
365.	A *	*Hoplias macrophthalmus* Pellegrin			×		×	×		×		
366.	A L	*Hoplerythrinus unitaeniatus* (Spix)			×	×	×	×	×	×	×	×
367.	A	*Erythrinus erythrinus* (Bloch and Schneider)			×	×	×	×	×	×	×	
368.	A	*Electrophorus electricus* (Linnæus)	×	×	?	×	×	×		×	×	×
369.	A L	*Gymnotus carapo* (Linnæus)	×	×	×	×	×	×	×	×	×	×
370.	A	*Sternopygus macrurus* (Bloch and Schneider)	×	×	×		×	×		×	×	
371.	*	*Eigenmannia macrops* (Boulenger)					×	×				
372.	A L	*Eigenmannia virescens* (Valenciennes)	×		×					×	×	
373.	A	*Eigenmannia lineatus* (Müller and Troschel)[19]			×	×	×	×		×		
374.	A	*Steatogenys elegans* (Steindachner)								×		
375.	A	*Hypopomus brevirostris* (Steindachner)		×	×	×			×	×		
376.	*	*Hypopomus artedi* Kaup					×			×		×
377.	A	*Rhamphichthys rostratus* (Linnæus)						×		×	×	×
378.		*Gymnorhamphichthys hypostomus* Ellis						×				
379.	A L	*Rhamphichthys marmoratus* Castelnau	×								×	
380.	*	*Sternarchorhynchus oxyrhynchus* (Müll. & Trosch.)					×	×				
381.	* *	*Sternarchogiton sachsi* (Peters)	×									
382.	A L	*Sternarchus albifrons* Linnæus	×					×			×	
383.	A	*Porotergus gimbeli* Ellis					×					

[19] No. 373 = No. 272.

			1 Orinoco Basin.	2 West Coast of British Guiana.	3 Rio Branco Basin.	4 Rupununi.	5 Lower Essequibo.	6 Lower Potaro.	7 Upper Potaro.	8 Demerara.	9 Dutch Guiana.	10 French Guiana.
384.	*	*Porotergus gymnotus* Ellis					×	×				
385.	*	*Sternarchus leptorhynchus* Ellis					×	×				
386.	A L	*Symbranchus marmoratus* Bloch	×			×	×				×	×
387.	M	*Tarpon atlanticus* (Cuvier and Valenciennes)								×		
388.	M * *	*Rhinosardinia serrata* Eigenmann		×								
389.	M A L	*Ilisha flavipinnis* (Valenciennes)								×	×	
390.	M *	*Odontognathus mucronatus* Lacépède								×		
391.	M A	*Pristigaster cayanus* Cuvier										
392.	M A	*Stolephorus spinifer* (Cuvier and Valenciennes)								×		
393.	M A	*Stolephorus clupeoides* (Swainson)									×	
394.	M *	*Stolephorus guianensis* Eigenmann		×			×			×		
395.	M A	*Stolephorus surinamensis* Bleeker					×				×	
396.	M A	*Pterengraulis atherinoides* (Linnæus)										
397.	M A	*Lycengraulis grossidens* (Cuvier)										
398.	A	*Osteoglossum bicirrhosum* Agassiz			×	×	×					
399.	A	*Arapaima gigas* (Cuvier)			×	×	×					×
400.	*	*Rivulus geayi* Vaillant										×
401.	A	*Rivulus urophthalmus* Günther										×
402.	A	*Rivulus micropus* Steindachner										×
403.	A	*Rivulus obscurus* Garman	×									
404.	*	*Rivulus breviceps* Eigenmann						×				
405.	*	*Rivulus holmiæ* Eigenmann							×			
406.	*	*Rivulus waimacui* Eigenmann						×				
407.	*	*Rivulus stagnatus* Eigenmann								×		
408.	*	*Rivulus lanceolatus* Eigenmann					×					
409.	*	*Rivulus frenatus* Eigenmann					×					
410.	A	*Anableps anableps* (Linnæus)	×							×	×	
411.	A	*Anableps microlepis* Müller and Troschel								×		
412.	A L	*Pœcilia vivipera* Bloch and Schneider	×							×	×	×
413.	A	*Acanthophacelus reticulatus* (Peters)	×	×						×		
414.	*	*Acanthophacelus melanzonus* Eigenmann								×		
415.	*	*Acanthophacelus bifurcus* Eigenmann								×		
416.	* *	*Tomeurus gracilis* Eigenmann		×						×		
417.	M	*Tylosurus microps* (Günther)									×	
418.	M	*Tylosurus almeida* Quoy and Gaimard									×	
419.	A L	*Potamorrhaphis guianensis* (Schomburgk)				×	×	×		×		×
420.	M	*Dorvrhamphus lineatus* (Valenciennes.)		×								
421.	M	*Mugil brasiliensis* Agassiz	?	?			?			×	?	?
422.	M	*Mugil cephalus* Linnæus	?	?			?			?	?	?
423.	M	*Mugil incilis* Hancock	?	?			?			?	?	?
424.	M	*Mugil curema* Cuvier and Valenciennes	?	?			?			×	?	?
425.	M	*Cynoscions acoupa* Lacépède[20, 21]								×	×	×
426.	M	*Cynoscion leiarchus* (Cuvier and Valenciennes)										×
427.	M	*Cynoscion virescens* (Cuvier and Valenciennes)[22]								×	×	
428.	M	*Cynoscion steindachneri* (Jordan)								×		
429.	M	*Cynoscion microlepidotus* (Cuvier and Val.)[23]									×	
430.	M	*Macrodon ancylodon* (Bloch and Schneider)[24]								×	×	×
431.	M	*Sagenichthys ancylodon* (Bloch and Schneider)									×	×

[20] Several other species of Sciænidæ may enter rivers.

[21] Lake Maracaibo.

[22] Porto Alegro, Brazil.

[23] Brazil.

[24] Panama, Rio Grande do Sul, Montevideo, West Indies.

			Orinoco Basin.	West Coast of British Guiana.	Rio Branco Basin.	Rupununi.	Lower Essequibo.	Lower Potaro.	Upper Potaro.	Demerara.	Dutch Guiana.	French Guiana.
			1	2	3	4	5	6	7	8	9	10
432.	M	*Bairdiella ronchus* (Cuvier and Valenciennes)[25]									×	
433.	M	*Nebris microps* Cuvier and Valenciennes[26]								×	×	
434.	A	*Plagioscion squamosissimus* (Heckel)[27]	×			×				×	×	
435.	A	*Plagioscion auratus* Castelnau[28]								×		
436.		*Plagioscion heterolepis* (Bleeker)									×	
437.	A	*Plagioscion surinamensis* (Bleeker)[29]									×	
438.	M	*Stellifcrus rastrifer* Jordan								×		
439.	A	*Pachypops furcræus* (Lacépède)		×		×				×	×	
440.	M	*Pachypops trifilis* (Müller and Troschel)								×		
441.	*	*Pachypops grunniens* (Schomburgk)				×		×				
442.	A L M	*Micropogon furnieri* (Desmarest)[30]								×	×	
443.	M	*Lonchiurus lanceolata* Bloch								×	×	
444.	M	*Centropomus undecimalis* (Bloch)								×		
445.	M	*Centropomus ensiferus* Poey								×		
446.	A	*Chætobranchus flavescens* Heckel			×	×	×			×		
447.	A	*Acaropsis nassa* (Heckel)	×			×	×			×		×
448.	* *	*Nannacara anomala* Regan		×						×		
449.	* *	*Nannacara bimaculata* Eigenmann						×				
450.	*	*Æquidens maronii* (Steindachner)		×						×	×	
451.	A	*Æquidens vittata* (Heckel)	×							×		
452.	*	*Æquidens potaroënsis* Eigenmann					×	×	×			
453.	A	*Æquidens tetramerus* (Heckel)			×	×	×			×		×
454.	*	*Æquidens geayi* (Pellegrin)			×	×	×	×				×
455.	*	*Æquidens guianensis* (Regan)[31]										
456.	A L	*Astronotus ocellatus* (Agassiz)			×							
457.	A L	*Mesonauta festivum* Heckel	×					×	×		×	
458.	A	*Cichlasoma bimaculatum* (Linnæus)	×		×	×				×	×	×
459.	A	*Cichlasoma temporale* (Günther)[31]										
460.	A	*Cichlasoma severum* (Heckel)				×		×				
461.	A	*Cichlasoma psittacum* (Heckel)	×									
462.	A	*Acarichthys heckelii* (Müller and Troschel)				×	×					
463.	A	*Biotodoma cupido* (Heckel)					×	×		×		
464.	?	*Geophagus pappaterra* Heckel										
465.	A	*Geophagus surinamensis* (Bloch)			×		×	×		×	×	×
466.	A	*Geophagus jurupari* Heckel			×	×	×			×		
467.	*	*Geophagus camopiensis* Pellegrin										×
468.	*	*Heterogramma ortmanni* Eigenmann				×	×	×				
469.	*	*Heterogramma steindachneri* Regan			×	×	×	×		×		
470.	A	*Cichla ocellaris* Bloch and Schneider	×		×	×	×	×		×	×	×
471.	A	*Cichla temensis* Humboldt	×	×								
472.	A	*Crenicara punctulata* (Günther)					×					
473.	*	*Batrachops punctulatus* Regan					×					
474.	A	*Batrachops semifasciatus* Heckel	×				?					
475.	A	*Crenicichla saxatilis* (Linnæus)		×			×			×	×	×
476.	*	*Crenicichla alta* Eigenmann					×	×	×			
477.	A ?	*Crenicichla wallacei* Regan					×	×	×			
478.	*	*Crenicichla multispinosa* Pellegrin									×	
479.	A L	*Crenicichla vittata* Heckel										×
480.	A	*Crenicichla lenticulata* Heckel	×									

[25] Maracaibo.
[26] Panama.
[27] Rios Crixas & Araguay.
[28] Rio Ucayale.
[29] Venezuela, Cauca.
[30] Havana.
[31] Guiana.

			Orinoco Basin.	West Coast of British Guiana.	Rio Branco Basin.	Rupununi.	Lower Essequibo.	Lower Potaro.	Upper Potaro.	Demerara.	Dutch Guiana.	French Guiana.
			1	2	3	4	5	6	7	8	9	10
481.	A	*Crenicichla lugubris* Heckel	×				×	×				
482.	A	*Crenicichla johanna* Heckel	×			×	×	×		×		
483.	A	*Pterophyllum scalare* (Cuvier and Valenciennes)				×	×					
484.	*	*Pterophyllum altum* Pellegrin	×									
485.	*	*Polycentrus schomburgki* Müller and Troschel	×	×						×		
486.	*	*Dormitator gymnocephalus* Eigenmann					×					
487.	*	*Eleotris amblyopsis* Cope		×						×		
488.	M	*Guavina guavina* (Cuvier and Valenciennes)		?			?			?		
489.	M	*Evorthodus breviceps* Gill		×							×	
490.	M	*Archirus lineatus* (Linnæus)					×	×		×		
491.	M	*Apionichthys unicolor* Günther								×		
492.	*	*Solenasus finis* Eigenmann						×				
493.	A	*Colomosus psittacus* (Bloch and Schneider)		×			×			×		
		Totals	89	50	85	83	184	142	22	167	118	75
		Total No. of species in Essequibo Basin.					266					

Of the four hundred and ninety-three species enumerated in the preceding list all but twenty-three, which are recorded from the Rio Branco only, inhabit the northward-flowing streams from the Orinoco on the west to the Brazilian boundary on the east. Of these two hundred and forty, or over 50 per cent., are also found in the Amazon.

In the Rio Branco, the only stream of the Guianas flowing southward which has been examined, twenty-three species have been taken, aside from those which it has in common with the upper Essequibo. The more readily to show the relation of the Rio Branco to the Rupununi and upper Essequibo, the fauna of the Essequibo is divided into (4) the fauna of the Essequibo above the Warraputa Cataract, (5) the fauna below the Warraputa, (6) the fauna of the lower Potaro, (7) the fauna of the upper Potaro.

From the Essequibo basin two hundred and sixty-six species have been taken, and this number may serve as a measure of our information, or lack of information, about the inhabitants of the other streams. From the large Orinoco basin but eighty-nine species have been recorded.

Distribution of the Species Obtained in the Area Examined.

The maps, given in Plates LXXI–CIII inclusive, graphically show the points at which the commoner species characteristic of the fauna were taken. A reference to these maps will, I trust, be useful to the student who is interested in the question of distribution.

In the following table the distribution of the species obtained is given. Species not obtained by me but reported by others have their approximate locality indicated by an asterisk. The number of specimens of each species obtained is given in the appropriate column under the several localities specified, thus indicating for each locality the relative abundance of the respective species found thereat, as well as the localities where each species was most numerous. For several unique localities the lists here given are repeated on subsequent pages.

The columns are not quite of equal value. Under the head of Lama Stop-off are given all specimens obtained between Maduni Stop-off and Cane Grove Corner. Few came from the latter place, most of them from Lama Stop-off, which is between the other two. The specimens from the Georgetown trenches include those from the Botanic Garden. The specimens from the northwestern coast include all those taken in and near Morawhanna, *i. e.*, Mora Passage, Aruka River, Koriabo Rubber Plantation, Issorora Plantation. The Kumaka column includes specimens from the Demerara River and its tributaries between Kumaka and Christianburg, a distance of several miles, and from some distance farther down the Demarara itself, at some mud-flats. The Rockstone column contains specimens from Rockstone itself, from the sand-bank just above Rockstone, and from a stream on Gluck Island across from Rockstone. The columns from Crab Falls, Tumatumari, Potaro Landing, Tukeit, Savannah Landing and Holmia contain similar groups of habitat. In all of these cases a radius of a mile would probably include all of them. I do not know how much Rupununi includes, but certainly Twoca Pan, and a creek opposite Massara Landing. All the specimens from this region were collected by Mr. Grant. Where a species was abundant in the Georgetown market the sign of infinity is substituted for the definite number of specimens preserved.

The water of the lower Demerara (see Figure 1) and of the ocean for some distance out is muddy. This muddy water is inhabited by a peculiar fauna. It is rich in *Aspredininæ, Ariinæ, Mugil, Anableps, Sciænidæ,* several sharks, and a sting-ray. In so far as these have any relation to the strictly fresh-water fauna they are included in the present report. No sharp line has been or can be drawn. No species has been omitted which should be included, but some of the species included should probably be excluded. This is notably true of some of the *Sciænidæ, Centropomidæ,* and *Mugilidæ* which are generally distributed in the West Indies. The *Aspredininæ, Ariinæ,* and *Anableps* more clearly belong to the South American estuarial fauna and all properly belong here. Most of the fishes brought to the Georgetown market come from the estuaries or coast.

	Coastal Streams.				Demerara.		Essequibo.						Lower Potaro.							Upper Potaro.			Amazon Basin.		
	Lama Stop-off, Maduni Stop-off, Cane Grove Corner.	Georgetown Trenches.	Georgetown Market and Harbor.	Northwest Coast.	Kumaka, Wismar, and Christianburg.	Malali.	Bartica.	Rockstone, Gluck Isl.	Crab Falls.	Konawaruk.	Warraputa.	Packeoo.	Rupununi, Twoca Pan.	Tumatumari.	Potaro Landing.	Kangarunma.	Erukin.	Amatuk.	Waratuk.	Tukeit.	Savannah Landing.	Holmia.	Aruataima.	Maripiern (above Karona Falls).	Chipoo Creek.	Nickaparoo.
Potamotrygon hystrix								3		1															
Paratrygon orbicularis													*												
Elipesurus spinicauda																									
Platystacus cotylephorus			S																						
Aspredo aspredo			* S																						
Aspredo sicuephorus			S S																						
Aspredinichthys tibicen			S S																						
Chamaigenes filamentosus			S																						
Bunocephalus gronovii					*																				
Bunocephalus amaurus									2																
Bunocephalus chamaizelus								6						7			6								
Agmus lyriformis								1					1												
Felichthys bagre			S	*																					
Felichthys marinus			S S																						
Sciadeichthys flavescens			1																						
Sciadeichthys emphysetus			5	*																					
Sciadeichthys proöps			S S S S																						
Sciadeichthys parkeri			S S S S																						
Selenaspis herzbergi[32]			S S S																						
Selenaspis passany			* S S																						
Notarius grandicassis			S S S																						
Notarius parmocassis			S S S																						
Notarius stricticassis			S S S																						
Arius spixi			S S S																						
Hexanematichthys rugispinis			S S S																						
Callophysus macropterus							*																		
Megaloncma platycephalum														5											
Pinirampus pirinampu[33]																									
Microglanis pacilus												8													
Pseudopimelodus villosus					1										3										
Pseudopimelodus albo-marginatus																		1	22						
Pseudopimelodus raninus																									
Brachyglanis frenata																	3								
Brachyglanis melas			7?						10		2														

[32] Mahaica.

[33] Mazaruni.

	Coastal Streams.				Demerara.		Essequibo.							Lower Potaro.							Upper Potaro.			Amazon Basin.		
	Lama Stop-off, Madduni Stop-off, Cane Grove Corner.	Georgetown Trenches.	Georgetown Market and Harbor.	Northwest Coast.	Kumaka, Wismar, and Christianburg.	Malali	Bartica.	Rockstone, Gluck Isl.	Crab Falls.	Konawaruk.	Warraputa.	Packeoo.	Rupununi, Twoca Pan.	Tumatumari.	Potaro Landing.	Kangaruma.	Erukin.	Amatuk.	Waratuk.	Tukeit.	Savannah Landing.	Holmia.	Aruataima.	Maripicru (above Karona Falls).	Chipoo Creek.	Nickaparoo.
Brachyglanis phalacra																		1								
Leptoglanis essequibensis									5	1	5															
Myoglanis potaroënsis															3		1	8	3	17						
Chasmocranus longior										2	12							13	1					3		
Chasmocranus brevior																		1	3							
Rhamdia laukidi																										
Rhamdia quelen															1							13	41		3	8
Rhamdia sebæ	1	1		41	2			14				1														
Rhamdia holomelas	7																									
Rhamdia arekaima													*													
Rhamdella foina											5															
Pimelodella cristata								1		2		1	2	12	12											
Pimelodella megalops									3					57												
Pimelodella maeturki		2		30																						
Pimelodus clarias	1	2		12	4		114	2	2				2	1												
Pimelodus ornatus								3	1					26	5											
Pimelodus heteropleurus													1													
Pimelodus altipinnis					*																					
Galdiella eques								1					11													
Phractocephalus hemiliopterus			1																							
Brachyplatystoma vaillanti[34]			16					1																		
Pseudoplatystoma fasciatum					1								4													
Doras granulosus																										
Doras costatus								4					2													
Doras hancocki	205				1			21					8	4												
Doras cataphractus		1						20								1										
Oxydoras niger													1													
Leptodoras linnelli		1?						2	6					28												
Hemidoras carinatus		3					1	92	116					133												
Hemidoras microstomus								2	12																	
Hemidoras micropæus	2				2																					
Hemidoras notospilus									1																	
Hemidoras leporhinus										3				1												
Centromochlus aulopygius					1										1											

[34] This species certainly occurs generally inland.

Trachycorystes glaber			*																												
Trachycorystes galeatus	12	4		6	1																										
Trachycorystes obscurus							*	†																							
Pseudauchenipterus nodosus[35]			8	1	2																										
Auchenipterus demeraræ					3	1																									
Auchenipterus brevior													21																		
Tympanopleura piperata								8																							
Agenciosus guianensis					1																										
Agenciosus brevifilis	1																														
Agenciosus marmoratus														1																	
Hypophthalmus edentatus[36]			5	1?	13																										
Helogenes marmoratus					?																	14		19	15						
Hemicetopsis macilentus														2																	
Hemicetopsis minutus																	1														
Pygidium guianense																									1						
Pygidium conradi																	1	1													
Pygidium gracilior																1															
Ochmacanthus flabelliferus								3																							
Callichthys callichthys[37]					15						7	*												10				1	1		
Hoplosternum littorale[38]		2	8																												
Hoplosternum thoracatum		1		3	5			74			1																	13			
Corydoras punctatus					7	16		16		16	1		2	29	3																
Pterygoplichthys duodecimalis[39]																															
Plecostomus plecostomus		1			4																										
Plecostomus hemiurus		1						3	4								4	7							2						
Plecostomus watwata[38]		2																													
Plecostomus emarginatus[40]																															
Lithogenes villosus																									1						
Corymbophanes andersoni																									1						
Hemiancistrus schomburgki[40]																															
Hemiancistrus megacephalus										1							9	5													
Hemiancistrus braueri[41]																															
Pseudancistrus barbatus								4	2	6																					
Pseudancistrus nigrescens																	2														
Pseudancistrus guentheri[40]																															
Xenacara gymnorhynchus								1																							
Aneistrus temmineki											2	2																2			
Aneistrus cirrhosus																											*[42]				
Aneistrus hoplogenys								1			9	18																			
Ancistrus lithurgicus									16																						
Lithoxus lithoides									13	7	72						87	3													
Loricaria cataphracta				1	1				1																						
Loricariichthys microdon												3																			
Loricariichthys griseus							22			12																					
Loricariichthys brunneus	19	1			11	2		32				6	4																		
Loricariichthys platyurus														1																	

[35] Mahaica. [36] Taken by Ellis in the Georgetown Harbor. † Taken by Ellis. [37] Pacopoo Pan. [38] Mahaica. [39] Demerara.
[40] British Guiana. [41] Takutu. [42] Ireng River near Holmia.

	Coastal Streams.				Demerara.		Essequibo.							Lower Potaro.							Upper Potaro.			Amazon Basin.		
	Lama Stop-off, Maduni Stop-off, Cane Grove Corner.	Georgetown Trenches.	Georgetown Market and Harbor.	Northwest Coast.	Kumaka, Wismar and Christianburg.	Malali.	Bartica.	Rockstone, Gluck Isl.	Crab Falls.	Konawaruk.	Warraputa.	Packeoo.	Rupununi, Twoca Pan.	Tumatumari.	Potaro Landing.	Kangaruma.	Erukin.	Amatuk.	Waratuk.	Tukeit.	Savannah Landing.	Holmia.	Aruataima.	Maripieru (above Karona Falls).	Chipoo Creek.	Nickaparoo.
Loricariichthys stewarti																									12	
Hemiodontichthys acipenserinus								1																		
Harttia platystoma								12		4	20															
Farlowella hargreavesi[43]																										
Bivibranchia protractila							9	18	3																	
Curimatopsis macrolepis	131	1			3			19		2																
Curimatella alburna													25													
Curimatus spilurus					78			333	1	8		9	220	9	2					22						
Curimatus microcephalus				2	2			61	7	2				214	8	11	29	8		3						
Curimatus morawhannæ				55																						
Curimatus issororoënsis				3																						
Curimatus schomburgki	31	7		138	21																					
Curimatus ciliatus								15	5	16	2		3													
Prochilodus rubrotæniatus								7						1												
Prochilodus maripicru																								3		
Parodon bifasciatus																								1		
Hemiodus semitæniatus								1		7																
Hemiodus quadrimaculatus									6					34				3		1						
Anisitsia notata	19				55	16	20	15	5					2												
Tylobronchus maculosus						1		21	1					51	20	3										
Chilodus punctatus								43	11	1			8													
Pyrrhulina filamentosa	166	2		141	96			24		2							2			7	50	104	35			
Characidium laterale																		4								
Characidium vintoni																				53						
Characidium blennioides									12					5	2		7	13		1						
Characidium fasciatum																								21		
Characidium pellucidum								2																		
Characidium pteroides					1			1		3																
Characidium catenatum								12	2		1															
Nannostomus beckfordi		*																								
Nannostomus marginatus					2			7	2																	
Nannostomus minimus																	3	1								
Nannostomus simplex	2																									
Pœcilobrycon harrisoni					3																					

[43] Locality unknown.

| | | |

	Coastal Streams.				Demerara.		Essequibo.							Lower Potaro.							Upper Potaro.			Amazon Basin.		
	Lama Stop-off, Madumi Stop-off, Cane Grove Corner.	Georgetown Trenches.	Georgetown Market and Harbor.	Northwest Coast.	Kumaka, Wismar, and Christianburg.	Malali.	Bartica.	Rockstone, Gluck Isl.	Crab Falls.	Konawaruk.	Warraputa.	Packeoo.	Rupununi, Twoca Pan.	Tumatumari.	Potaro Landing.	Kangaruma,	Erukin.	Amatuk.	Waratuk.	Tukeit.	Savannah Landing.	Holmia.	Amataima.	Maripieru (above Karona Falls).	Chipoo Creek.	Nickaparoo.
Hemigrammus orthus								25				1								18						
Hemigrammus cylindricus								10	11					7												
Hemigrammus analis					2			94																		
Hyphessobrycon minor										3																
Hyphessobrycon rosaceus								27																		
Hyphessobrycon riddlei								1																		
Hyphessobrycon minimus	3																									
Hyphessobrycon gracilis								16																		
Hyphessobrycon eos																25				43						
Hyphessobrycon stictus	226				10			1																		
Dermatocheir catablepta														1												
Creatochanes affinis					6		1			2	1			47	5			6		27	8	45	9	30		
Creatochanes melanurus	39				129	14							*													
Creatochanes caudomaculatus				13	7	10	21	21	56	9				269	2											
Creagrutus melanzonus									1		2			3												
Bryconamericus hyphesson														11												
Pœciliurichthys polylepis					1			29	10					99												
Pœciliurichthys abramoides					4			2						87	2	27		48								
Pœciliurichthys bimaculatus	8	224		2																		5				
Pœciliurichthys potaroënsis																1	2	16		1						
Astyanax mucronatus														4						14						
Astyanax mutator																					121					
Astyanax essequibensis							1	3	75					97												
Astyanax guianensis								176	2		3			34												
Astyanax wappi[45]																										
Ctenobrycon spilurus		300																								
Deuterodon pinnatus										2	19							67	7		3					
Deuterodon potaroënsis																	2	6	3							
Phenacogaster microstictus								1	4	7				7												
Phenacogaster megalostictus								18	16					60				4		6						
Holobrycon pesu					1		18	8	2		1			21												
Brycon falcatus								1												12						
Brycon siebenthali				1																						
Chalceus macrolepidotus								5		5				26												
Fowlerina orbicularis	3				164			24	19	72	7			98	2	18	8	1								

[45] British Guiana.

Chalcinus elongatus				20																											
Chalcinus rotundatus					1		3		30																						
Carnegiella strigata	68				15	14		67					2	7	16																
Gasteropelecus sternicla				40	25														*	*	*										
Serrasalmo gymnogenys					1			26	2			4		1																	
Serrasalmo rhombeus					3		1	9	6			2	1	7																	
Pygocentrus niger[46]								*																							
Pygocentrus piraya													13																		
Pygocentrus scapularis					1			12	3																						
Pygocentrus bilineatus				5																											
Catoprion mento								1		3																					
Pygopristis denticulatus	23																														
Mylesinus schomburgki[47]																															
Acnodon oligocanthus					*																										
Metynnis hypsauchen							1	11					4																		
Metynnis maculatus	6							1					6																		
Myloplus pacu							*				15		*																		
Myloplus rubripinnis						1	1	3	11					1																	
Myloplus asterias[48]						2																									
Myloplus rhomboidalis							1	1	1	1	7			2					8												
Cynodon gibbus					5	2																									
Hydrolicus scomberoides[49]																															
Exodon paradoxus													1																		
Raboides thurni								5	9																						
Charax gibbosus	20	702		21	11			29	52	2				1																	
Charax rupununi													5																		
Asiphonichthys hemigrammus								1																							
Cynopotamus essequibensis								7						1	1																
Acanthocharax microlepis								22	3					44																	
Heterocharax macrolepis					1			4																							
Acestrorhynchus falcatus	21			1	3	2		1		1		2			1		1	3		1											
Acestrorhynchus microlepis	8	9		1	2	4		17	17	5				10	1		1														
Acestrorhynchus falcirostris	4				1	4		2		2			2																		
Acestrorhynchus nasutus								1																							
Hydrocynus cuvieri								28					1																		
Hoplias macrophthalmus					6	3		1						1	1					3					2						
Hoplias malabaricus	20	24		28	7			15	1			1	1		1			12	1		4	9	2		3	3					
Hoplerythrinus unitaeniatus	1	14						1				1	6								2	8	10			1					
Erythrinus erythrinus					4			1				14			2					10	3	37	9			16					
Electrophorus electricus[50]														3	3																
Gymnotus carapo		2		10	12			4				7								30		34	15	1	1	32					
Sternopygus macrurus		122		7	10				8	2	3				10		6	9	1												
Eigenmannia macrops								32	12					12																	
Eigenmannia virescens		181			35							4		1		2	1								3	5					
Steatogenys elegans					5																										
Hypopomus brevirostris[51]				4	1									1							2				2	4					

[46] In streams 150 miles and more from the coast. [47] Guiana. [48] Essequibo and Mazaruni. [49] Essequibo and all streams. Taken by Ellis on Gluck Island. [50] Pacopoo Pan (one). [51] Pacopoo Pan (two).

	Coastal Streams.				Demerara.		Essequibo.							Lower Potaro.							Upper Potaro.			Amazon Basin.		
	Lama Stop-off, Madúni Stop-off, Cane Grove Corner.	Georgetown Trenches.	Georgetown Market and Harbor.	Northwest Coast.	Kumaka, Wismar, and Christianburg.	Malali.	Bartica.	Rockstone, Gluck Isl.	Crab Falls.	Konawaruk.	Warraputa.	Packeoo.	Rupununi, Twoca Pan.	Tumatumari.	Potaro Landing.	Kangaruma.	Erukin.	Amatuk.	Waratuk.	Tukeit.	Savannah Landing.	Holmia.	Aruataima.	Maripieru (above Karona Falls).	Chipoo Creek.	Nickaparoo.
Hypopomus artedi	2	...	...	...	6	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rhamphichthys rostratus	...	...	...	...	3	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...
Gymnorhamphichthys hypostomus	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	...	...	...	...	...	...	...	...	...
Sternarchorhynchus oxyrhynchus [52]	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Porotergus gymnotus	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	3	...	...	...	...	...	...	...	...
Porotergus gimbeli [53]	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sternarchus leptorhynchus	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...
Sternarchus albifrons [53]	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6	...	...	...	...	...	...	...	...	...	...	...
Symbranchus marmoratus	...	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...
Osteoglossum bicirrhosum	...	...	...	...	...	...	...	...	×	...	...	...	7	...	...	...	...	...	...	...	...	...	...	...	...	...
Arapaima gigas [54]	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Tarpon atlanticus	×	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rhinosardinia serrata	...	...	...	296	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Ilisha flavipinnis	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Odontognathus mucronatus	...	...	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stolephorus guianensis	...	...	...	13	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stolephorus surinamensis	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stolephorus spinifer	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rivulus breviceps	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	...	...	...	...	...	...
Rivulus holmiæ	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	18	...	...	...	...
Rivulus waimacui	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	13	...	...	...	...	...	...
Rivulus stagnatus	...	...	...	...	20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rivulus lanceolatus	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rivulus frenatus	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Anableps anableps	...	...	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Anableps microlepis	...	...	51	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Pœcilia vivipara	...	62	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Acanthophacelus melanzonus	...	20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Acanthophacelus reticulatus	...	158	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Acanthophacelus bifurcus	...	...	...	...	75	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Tomeurus graeilis	...	...	...	7	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Potamorrhaphis guianensis	5	...	...	...	5	...	...	9	...	5	...	...	6	3	2	...	...	...	...	...	...	...	...	...	...	...
Doryrhamphus lineatus	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mugil brasiliensis	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mugil incilis	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

[52] Essequibo.

[53] Hubabu creek.

[54] From Potaro mouth upward.

Mugil curema			8																									
Cynoscion acoupa			17																									
Cynoscion steindachneri			4																									
Cynoscion virescens			5																									
Sagenichthys ancylodon			9																									
Nebris microps			7																									
Plagioscion auratus			1																									
Plagioscion squamosissimus[55]			1																									
Stellifer rastrifer	1		7																									
Pachypops furcræus				1	3		918																					
Pachypops grunniens									3				1															
Lonchurus lanceolatus			2																									
Micropogon furnieri			13																									
Centropomus undecimalis			11																									
Centropomus ensiferus			11																									
Chætobranchus flavescens	3							1				8																
Acaropsis nassa[56]	52				6			7				2																
Nannacara anomala	19			2																								
Nannacara bimaculata																	1											
Æquidens maroni				1	17																							
Æquidens geayi								2	1	1		1		3	2		1	8							8			
Æquidens vittatus	61				4	9																						
Æquidens potaroënsis[57]									1	1				1	4	3	17	1	25	27	33	5						
Æquidens tetramerus	3							8				1																
Cichlasoma bimaculatum[58]	1	76				5																						
Cichlasoma severum																	1											
Mesonauta festivum	48	12			12	24		3	1	7		1	14															
Acarichthys heckeli								6				3																
Geophagus surinamensis					10	2	5	6	2																			
Geophagus jurupari	35	1			48	4		9	1	7	1	1	9															
Biotodoma cupido	7					1		19	1	13				1														
Heterogramma ortmanni								4		11		1				1	46				1							
Heterogramma steindachneri	53				5			39				4	1	1												2		
Cichla ocellaris	7							186			1		2	1														
Crenicara punctulata								1																				
Batrachops punctulatus									2																			
Crenicichla saxatilis	21	10		22	5			2																				
Crenicichla alta								25		5			5		2		2	8		4	2	9	8					
Crenicichla wallacei								39	3	11			3	1														
Crenicichla lugubris							2	1	1		1			1				1	2	2								
Crenicichla johanna	6				3				1			1		1	8													
Pterophyllum scalare								6	7				4															
Polycentrus schomburgki	47	40		1	12																							
Dormitator gymnocephalus										1																		
Eleotris amblyopsis		1		2																								
Quavina quavina[59]																												

[55] Falls of the Mazaruni. [56] Tusaca Pan. [57] Ireng River near Holmia. [58] Pacopoo Pan (eight). [59] Mouths of rivers.

	Coastal Streams.				Demerara.		Essequibo.							Lower Potaro.								Upper Potaro.			Amazon Basin.		
	Lama Stop-off, Maduni Stop-off, Cane Grove Corner.	Georgetown Trenches.	Georgetown Market and Harbor.	Northwest Coast.	Kumaka, Wisunar, and Christianburg.	Malali.	Bartica.	Rockstone, Gluck Isl.	Crab Falls.	Konawaruk.	Warraputa.	Packeoo.	Rupununi, Twoca Pan.	Tumatumari.	Potaro Landing.	Kangaruma.	Erukin.	Amatuk.	Waratuk.	Tukeit.	Savannah Landing.	Holmia.	Aruataima.	Maripieru (above Karona Falls).	Chipoo Creek.	Nickaparoo.
Evorthodus breviceps			2																							
Achirus lineatus		1	27					4						2												
Apionichthys unicolor			2																							
Solconasus finis														2												
Colomesus psittacus			8				24																			

Summary of the Number of Species of each Family in the different Localities.

Dasyatidæ								1		1																
Aspredinidæ			3					2		1			1	1			1									
Siluridæ	7	7	16	5	11	1	2	12	10	4	5	3	8	9	7	1	1	5	4	2		1	1	1	2	1
Hypophthalmidæ				1	1																					
Helogenеidæ																				1		1	1			
Pygidiidæ										1					1		1	2	1				1			
Callichthyidæ		2	1	1	3	1		2		1		2		1	1	1						1			2	1
Loricariidæ	1	4		1	3	1	1	7	5	3	4	2	4	1	1			4	3				2	2	2	
Characidæ	23	12		20	48	15	22	83	48	32	14	10	22	55	20	10	13	23	4	22	9	9	6	9	1	5
Gymnotidæ	1	4		3	8			3	2	2	4	1	2	3	4	1	1	4	1	1	1	1	1	2	3	1
Symbranchidæ								1					1													
Osteoglossidæ									1				1													
Arapaimidæ									1				1													
Clupeidæ	1	1	2	1																						
Stolephoridæ			1	1	1		2																			
Pœciliidæ		3	2	2	3			2										1	1	2		1				
Belonidæ	1				1			1		1			1	1	1											
Doryrhamphidæ				1																						
Mugilidæ			3																							
Sciænidæ	1		9	1	1		1		1					1												
Centropomidæ			2																							
Cichlidæ	13	4			9	5	2	18	11	8	3	7	12	8	4	2	6	4	2	3	3	2	2	1	2	1
Polycentridæ	1	1		1	1																					
Gobiidæ		1		2						1																
Soleidæ		1	2					1						2												
Tetraodontidæ			1				1																			
Totals	49	40	42	40	90	23	31	133	79	55	30	25	53	82	39	15	23	43	16	31	13	16	14	15	12	9

Summary of the Number of Species of each Family taken at but one Locality.

	Coastal Streams.				Demerara.		Essequibo.							Lower Potaro.							Upper Potaro.			Amazon Basin.		
	Lana Stop-off, Madumi Stop-off, Cane Grove Corner.	Georgetown Trenches.	Georgetown Market and Harbor.	Northwest Coast.	Kumaka, Wismar, and Christianburg.	Malali.	Bartica.	Rockstone, Glnck Isl.	Crab Falls.	Konawaruk.	Warraputa.	Packeoo.	Rupununi, Twoca Pan.	Tumatumari.	Potaro Landing.	Kangaruma.	Erukin.	Amatuk.	Waratuk.	Tukeit.	Savannah Landing.	Holmia.	Aruataima.	Maripicru (above Karona Falls).	Chipoo Creek.	Nickaparoo.
Aspredinidæ	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Siluridæ	1	...	...	...	1	...	...	1	2	...	1	1	2	2	1	...	...	2	...	...	...	...	...	...	...	...
Pygidiidæ	...	...	...	...	...	...	...	...	...	1	...	...	...	...	1	...	...	1	...	...	...	...	1	...	...	...
Loricariidæ	...	1	...	...	...	...	...	2	1	...	...	...	1	...	1	...	...	1	...	...	...	...	2	...	1	...
Characidæ	4	1	...	6	2	1	...	10	1	3	1	...	3	4	...	...	1	1	...	1	1	...	...	4	...	...
Gymnotidæ	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Osteoglossidæ	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...
Clupeidæ	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stolephoridæ	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Pœciliidæ	...	2	...	...	1	...	...	2	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...
Doryrhamphidæ	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sciænidæ	...	...	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...
Cichlidæ	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...
Gobiidæ	...	...	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Soleidæ	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	..
Tetraodontidæ	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Totals	5	5	...	9	6	1	2	15	6	6	2	1	7	8	3	...	2	5	...	2	1	1	3	4	1	...

SUMMARY OF FAMILIES.

Dasyatidæ	2	Clupeidæ	4
Aspredinidæ	9	Stolephoridæ	3
Siluridæ	67	Pœciliidæ	13
Hypophthalmidæ	1	Belonidæ	1
Helogeneidæ	1	Syngnathidæ	1
Pygidiidæ	6	Mugilidæ	2
Callichthyidæ	4	Sciænidæ	12
Loricariidæ	28	Centropomidæ	2
Characidæ	150	Cichlidæ	27
Gymnotidæ	14	Polycentridæ	1
Symbranchidæ	1	Gobiidæ	4
Osteoglossidæ	1	Soleidæ	3
Arapaimidæ	1	Tetraodontidæ	1
Elopidæ	1		360

CHAPTER V.

ECOLOGICAL COMBINATIONS OF SPECIES.

In many localities it was not profitable to mark the specimens separately in such a way that their exact locality could be retained. For instance, all species taken on the sand-bar at Rockstone were marked "Rockstone Sand-bar." Later it became evident that it might have been profitable to keep separate: (*a*) the species taken at night from a bay on the bar—they were largely big fishes; (*b*) those taken on the river side of the bar; (*c*) those taken in the bayou on the land side of the bar; (*d*) those taken with a large net from the lower end of the bar. Each of these places yielded its own fauna, but their separation must be left to someone else.

The places of greatest interest in this connection are probably one of the trenches in the Botanic Garden, a woodland brook on Gluck Island, the Konawaruk pool, and the Warraputa, or Amatuk, Cataracts. In each of these places a single unit was studied exhaustively. At Amatuk, however, where the cataract furnished most of the specimens, a few species were obtained by seining on the sand-bar below the fall. From each of these units practically a complete list of species and the relative number of individuals of each species can be given.

In the Botanic Garden a trench, said to have been undisturbed for twenty years or more, was drained and most of its contents preserved. On Gluck Island a short stretch of a small woodland brook was poisoned and everything but a few larger catfishes and cichlids preserved. At Konawaruk everything in a pool less than one hundred feet in diameter was killed and preserved. In the cataracts at Amatuk and at Warraputa the fishes were either all killed or driven out by poison, and everything possible secured and preserved. A list of the captures at these places will therefore give us the ecological composition of the various faunas.[61] In the following tables species not taken elsewhere are in italics.

[61] These might be supplemented by the list of fishes taken at Erukin, where everything in the lower two hundred yards of the stream was taken, and by that at Aruataima. All but *Corymbophanes*, *Pygidium*, and *Lithogenes* of the fishes listed from Aruataima came from the small brooks.

Species and Number of Specimens from a Trench in the Botanic Garden.

It would seem from this list that the bulk of the fauna is composed of seven out of the twenty-three species.

Siluridæ.

1. Rhamdia sebæ..... 1
2. Pimelodus clarias..... 2

Callichthyidæ.

3. Hoplosternum littorale..... 2
4. Hoplosternum thoracatum..... 1

Loricariidæ.

5. Plecostomus hemiurus..... 1
6. Loricariichthys brunneus..... 1

Characidæ.

7. Curimatopsis macrolepis..... 1
8. Curimatus schomburgki 3
9. Pristella riddlei..... 233[62]
10. Hemigrammus rodwayi..... 112
11. Pœcilurichthys bimaculatus..... 122
12. Ctenobrycon spilurus.....about 800
13. Charax gibbosus..... 630
14. Acestrorhynchus microlepis..... 6
15. Hoplias malabaricus..... 6

Gymnotidæ.

16. Gymnotus carapo..... 1
17. Sternopygus macrurus..... 104
18. Eigenmannia lineata..... 155

Cichlidæ.

19. Cichlasoma bimaculatum..... 17
20. Mesonauta festivum..... 12
21. Geophagus jurupari..... 1
22. Crenicichla saxatilis..... 3

Polycentridæ.

23. Polycentrus schomburgki 39

Species and Number of Specimens from a Small Brook on Gluck Island.

Aspredinidæ.

1. Bunocephalus chamaizelus..... 6
2. Agmus lyriformis..... 1

Siluridæ.

3. Rhamdia sebæ..... 14
4. Doras costatus..... 4
5. Doras hancocki 12
6. Doras cataphractus..... 20

Callichthyidæ.

7. Hoplosternum thoracatum..... 74

Loricariidæ.

8. Plecostomus hemiurus..... 1
9. *Xenocara gymnorhynchus*..... 1
10. Loricariichthys brunneus..... 24
11. *Hemiodontichthys acipenserinus* .. 1

Characidæ.

12. Curimatopsis macrolepis..... 3
13. Curimatus spilurus..... 15
14. Chilodus punctatus..... 1
15. Hemiodus maculofasciatus..... 1
16. Anisitsia notatus..... 2
17. Pyrrhulina filamentosa..... 22
18. Nannostomus marginatus..... 5
19. Pœcilobrycon trifasciatus..... 8
20. Pœcilobrycon erythrurus..... 4
21. Pœcilobrycon ocellatus..... 9
22. *Characidium pellucidum*..... 2
23. Leporinus nigrotæniatus..... 2
24. Iguanodectes tenuis..... 4
25. Mœnkhausia lepidurus..... 8
26. Mœnkhausia colletti..... 12

[62] From the Georgetown trenches only eight specimens were taken.

27. Mœnkhausia copei 11
28. Hemigrammus ocellifer 109
29. Hemigrammus iota 3
30. Hemigrammus orthus 25
31. Hemigrammus cylindricus 1
32. Hyphessobrycon rosaceus 25
33. *Hyphessobrycon gracilis* 16
34. Creatochanes caudomaculatus 20
35. Pœciliurichthys polylepis 10
36. Pœciliurichthys abramoides 1
37. Holobrycon pesu 1
38. Chalceus macrolepidotus 5
39. Carnegiella strigata 43
40. Myleus rhomboidalis . . . . . (young) 1
41. Acestrorhynchus falcatus 1
42. Hoplias malabaricus 13
43. Hoplerythrinus unitæniatus 1

Pœciliidæ.

44. Rivulus frenatus 1

Belonidæ.

45. Potamorrhaphis guianensis 3

Gymnotidæ.

46. Gymnotus carapo 4
47. Hypopomus artedi 2

Cichlidæ.

48. Æquidens tetramerus 4
49. Æquidens geayi 1
50. Mesonauta festivum 3
51. Acarichthys heckeli 4
52. Biotodoma cupido 6
53. Geophagus jurupari 3
54. Heterogramma ortmanni 3
55. Heterogramma steindachneri 25
56. Cichla ocellaris 2
57. *Crenicara punctulata* 1
58. Crenicichla saxatilis 2
59. Crenicichla alta 14
60. Crenicichla wallacei 8

Rhamdia sebæ and *Crenicichla saxatilis* and *alta* were present in larger proportion than this table indicates, many specimens being retained by the Indians. Only the young of the larger species were living in this brook.

Species and Number of Specimens from the Konawaruk Pool.

Dasyatidæ.

1. Potamotrygon hystrix 1

Aspredinidæ.

2. *Bunocephalus amaurus* 2

Siluridæ.

3. Leptoglanis essequibensis 1
4. Chasmocranus longior 2
5. Pimelodella cristata 2
6. Hemidoras leporhinus 3

Pygidiidæ.

7. Ochmacanthus flabelliferus 3

Callichthyidæ.

8. Corydoras punctatus 16

Loricariidæ.

9. Lithoxus lithoides 7
10. Loricariichthys griseus 12
11. Harttia platystoma 4

Characidæ.

12. Curimatopsis macrolepis 2
13. Curimatus spilurus 8
14. Curimatus microcephalus 2
15. Curimatus ciliatus 16
16. Hemiodus maculofasciatus 7
17. Chilodus punctatus 1
18. Pyrrhulina filamentosa 2
19. Characidium pteroides 3
20. Pœcilobrycon trifasciatus 17
21. Pœcilobrycon ocellatus 18
22. Leporinus fasciatus 1
23. *Odontostilbe melandetus* 3
24. *Aphyodite grammica* 3
25. Iguanodectes tenuis 10

26. Mœnkhausia chrysargyreus..... 15
27. Mœnkhausia dichrourus..... 12
28. Mœnkhausia lepidurus..... 22
29. Mœnkhausia colletti..... 19
30. Hemigrammus ocellifer..... 3
31. *Hyphessobrycon minor*..... 3
32. Creatochanes affinis..... 1
33. Deuterodon pinnatus..... 2
34. Phenacogaster microstictus..... 7
35. Chalceus macrolepidotus..... 5
36. Fowlerina orbicularis..... 72
37. Catoprion mento..... 3
38. Myloplus rhomboidalis..... 1
39. Charax gibbosus..... 2
40. Acestrorhynchus falcatus..... 1
41. Acestrorhynchus microlepis..... 5
42. Acestrorhynchus falcirostris..... 2

GYMNOTIDÆ.

43. Sternopygus macrurus..... 2
44. Porotergus gymnotus..... 1

BELONIDÆ.

45. Potamorrhaphis guianensis..... 5

CICHLIDÆ.

46. Æquidens geayi..... 1
47. Æquidens potaroënsis..... 1
48. Crenicichla alta..... 5
49. Crenicichla wallacei..... 11
50. Mesonauta festivum..... 7
51. Geophagus jurupari..... 7
52. Biotodoma cupido..... 13
53. Heterogramma ortmanni..... 11

GOBIIDÆ.

54. *Dormitator gymnocephalus.*

SPECIES AND NUMBER OF SPECIMENS FROM THE WARRAPUTA CATARACT.

As stated before, the specimens taken at this place all came from a small branch of the cataract where the water wound its way about and under rocks. The fishes were driven from their hiding-places by poison.

SILURIDÆ.

1. Brachyglanis melas..... 2
2. Leptoglanis essequibensis..... 5
3. Chasmocranus longior..... 12
4. *Rhamdella foina*..... 5

LORICARIIDÆ.

5. Hemiancistrus megacephalus..... 1
6. Pseudancistrus barbatus..... 6
7. Lithoxus lithoides..... 72
8. Harttia platystoma..... 20

CHARACIDÆ.

9. Curimatus ciliatus..... 2
10. Characidium catenatum..... 1
11. Iguanodectes tenuis..... 6
12. Mœnkhausia chrysargyreus..... 1
13. Mœnkhausia dichrourus..... 2
14. Mœnkhausia lepidurus..... 7
15. Creatochanes affinis..... 1
16. Creagrutus melanzonus..... 2
17. Astyanax guianensis..... 3
18. Deuterodon pinnatus..... 19
19. Holobrycon pesu..... 1
20. Fowlerina orbicularis..... 7
21. Myloplus pacu..... 15
22. Myloplus rhomboidalis..... 7

GYMNOTIDÆ.

23. Sternopygus macrurus..... 3
24. Eigenmannia virescens..... 4
25. Sternarchorhynchus oxyrhynchus 1
26. Sternarchus leptorhynchus..... 1

CICHLIDÆ.

27. Geophagus jurupari..... 1
28. Cichla ocellaris..... 1
29. Crenicichla lugubris..... 1

Species and Number of Specimens from the Amatuk Cataract.

Siluridæ.

1. *Brachyglanis frenata*..... 3
2. *Brachyglanis phalacra*..... 1
3. Myoglanis potaroënsis..... 8
4. Chasmocranus longior..... 13
5. Chasmocranus brevior..... 1

Pygidiidæ.

6. *Hemicetopsis minutus*..... 1
7. Pygidium conradi..... 1

Loricariidæ.

8. Plecostomus hemiurus..... 4
9. Hemiancistrus megacephalus.... 9
10. *Pseudancistrus nigrescens*..... 2
11. Lithoxus lithoides..... 87

Characidæ.

12. Curimatus microcephalus..... 8
13. Hemiodus pellegrini..... 3
14. *Characidium laterale*.....
15. Characidium blennioides..... 13
16. Nannostomus minimus..... 1
17. Pœcilobrycon erythrurus..... 1
18. Anostomus anostomus..... 2
19. Anostomus plicatus..... 2
20. Leporinus arcus..... 2
21. Leporinus megalepis..... 12
22. Mœnkhausia browni..... 2
23. Mœnkhausia colletti.....
24. Creatochanes affinis..... 1
25. Pœcilurichthys abramoides..... 48
26. Pœcilurichthys potaroënsis..... 13
27. Deuterodon pinnatus..... 67
28. Deuterodon potaroënsis..... 6
29. Phenacogaster megalostictus..... 4
30. Fowlerina orbicularis..... 7
31. Myloplus rhomboidalis..... 8
32. Acestrorhynchus falcatus..... 3
33. Hoplias malabaricus..... 12

Gymnotidæ.

34. Sternopygus macrurus..... 9
35. Sternarchorhynchus oxyrhynchus 4
36. Sternarchus gymnotus..... 3
37. Sternarchus leptorhynchus..... 2

Pœciliidæ.

38. Rivulus waimacui..... 1

Cichlidæ.

39. Æquidens geayi..... 8
40. Æquidens potaroënsis..... 17
41. Crenicichla alta..... 8
42. Crenicichla lugubris..... 1

Species of the Coastal Streams not taken in any of the Inland Stations or not beyond Wismar and Rockstone.

Those species extending as far as Rockstone or Wismar are in italics, those near the coast or in brackish water are marked with an *. The *Ariinæ* are not considered in this list.

Siluridæ.

1. Pimelodella macturki.
2. *Hemidoras micropæus.*
3. *Trachycorystes galeatus.*
4. *Pseudauchenipterus cæruleus.*
5. Ageneiosus brevifilis.

Callichthyidæ.

6. Hoplosternum littorale.

Loricariidæ.

7. Plecostomus watwata.
8. *Plecostomus plecostomus.*

Characidæ.

9. *Curimatus schomburgki.*
10. Curimatus morawhannæ.
11. Curimatus issororoënsis.
12. *Piabucus dentatus.*

13. *Pristella riddlei.*
14. Pristella aubynei.
15. *Hemigrammus unilineatus.*
16. Hemigrammus rodwayi.
17. Hyphessobrycon minimus.
18. Ctenobrycon spilurus.
19. Chalcinus elongatus.
20. Pygocentrus bimaculatus.

CLUPEIDÆ.

21.*Rhinosardinia serrata.

STOLEPHORIDÆ.

22.*Stolephorus guianensis.

PŒCILIIDÆ.

23.*Pœcilia vivipara.
24. Acanthophacelus melanzonus.
25.*Acanthophacelus reticulatus.
26. *Tomeurus gracilis.*

DORYRHAMPHIDÆ.

27.*Doryrhamphus lineatus.

CICHLIDÆ.

28. Nannocara anomala.
29. *Æquidens moroni.*

GOBIIDÆ.

30.*Elcotris amblyopsis.
31.*Evorthodus brevieeps.

A few of these species, like *Ageneiosus brevifilis*, are not limited to this area, but as no specimens were captured in the interior they are included in this list.

LIST OF SPECIES NOT TAKEN AT ROCKSTONE, WISMAR, OR LOWER DOWN IN THE ESSEQUIBO AND DEMERARA RIVERS.

While the downward limit of many of these species has not been determined it seems certain that they are excluded from the coastal regions. Sixteen species marked with an * extend as far down as Crab Falls. The large number (eighty-two species) not found at Rockstone shows that the fauna of the upper courses of the river is much richer in exclusives than the coastal region with its thirty-one peculiar forms.

SILURIDÆ.

1. Megalonema megacephalum.
2. Mieroglanis pœcilus.
3. Pseudopimelodus albomarginatus.
4. Brachyglanis frenata.
5. Brachyglanis phalaera.
6.*Leptoglanis essequibensis.
7. Myoglanis potaroënsis.
8. Chasmocranus longior.
9. Chasmocranus brevior.
10. Rhamdia quelen.
11. Rhamdella foina.
12.*Pimelodella megalops.
13. Pimelodus heteropleurus.
14. Oxydoras niger.
15.*Hemidoras notospilus.
16. Hemidoras leporhinus.
17. Auchenipterus brevior.
18.*Tympanopleura piperata.

PYGIDIIDÆ.

19. Hemicetopsis macilentus.
20. Hemicetopsis minutus.
21. Pygidium guianense.
22. Pygidium conradi.
23. Pygidium gracilior.
24. Ochmacanthus flabelliferus.

LORICARIIDÆ.

25. Lithogenes villosus.
26. Corymbophanes andersoni.
27. Hemiancistrus megacephalus.
28. Pseudancistrus nigrescens.

29. Ancistrus temminckii.
30.*Ancistrus lithurgicus.
31.*Lithoxus lithoides.
32. Loricariichthys microdon.
33. Loricariichthys platyurus.

CHARACIDÆ.

34. Curimatella alburnus.
35.*Hemiodus quadrimaculatus.
36. Characidium laterale.
37. Characidium vintoni.
38.*Characidium blennioides.
39. Nannostomus minimus.
40.*Anostomus anostomus.
41. Schizodon fasciatus.
42.*Schizodontopsis laticeps.
43. Leporinus arcus.
44. Leporinus granti.
45. Pœcilocharax bovallii.
46. Odontostilbe melandetus.
47. Aphyodite grammica.
48. Tetragonopterus argenteus.
49. Mœnkhausia oligolepis.
50. Mœnkhausia browni.
51.*Mœnkhausia dichrourus.
52. Hemigrammus erythrozonus.
53. Hyphessobryeon minor.
54. Hyphessobryeon eos.
55. Dermatocheir catablepta.
56.*Creagrutus melanzonus.
57. Bryconamericus hyphesson.
58. Pœcilurichthys potaroënsis.
59. Astyanax mucronatus.
60. Astyanax mutator.
61. Deuterodon pinnatus.
62. Deuterodon potaroënsis.
63. Pygocentrus piraya.
64. Exodon paradoxus.
65. Charax rupununi.
66. Gymnorhamphichthys hypostomus.

GYMNOTIDÆ.

67. Sternarchorhynchus oxyrhynchus.
68. Porotergus gymnotus.
69. Sternarchus leptorhynchus.
70. Sternarchus albifrons.

OSTEOGLOSSIDÆ.

71.*Osteoglossum bicirrhosum.

PŒCILIIDÆ.

72. Rivulus breviceps.
73. Rivulus holmiæ.
74. Rivulus waimacui.

SCIÆNIDÆ.

75. Pachyurus schomburgkii.
76.*Pachypops grunniens.

CICHLIDÆ.

77. Nannocara bimaculatum.
78.*Æquidens potaroënsis.
79. Cichlasoma severum.
80.*Batrachops punctulatum.

GOBIIDÆ.

81. Dormitator gymnocephalus.

SOLEIDÆ.

82. Soleonasis finis.

CHAPTER VI.

THE ICHTHYIC FAUNA OF THE POTARO RIVER AND OF THE GUIANA PLATEAU.

The Guiana Highland has a double interest. First, it is presumably one of the oldest land-masses of South America, probably dating back to the time when Africa and South America were connected by land or by a chain of islands. Second, all of the rivers, *so far as known*, descend from the plateau over falls which no fish can ascend, the most prominent of these being the Kaieteur, with a height of seven hundred and forty-one feet, which divides the Potaro into an upper and a lower course.

Measurements made by Brown show that the Potaro, six hundred feet above the fall, is four hundred and two feet wide and twenty and two-tenths feet deep. At the brink of the fall it is three hundred and sixty-nine feet wide. These measurements are taken at flood. The fall is seven hundred and forty-one feet high and in the one thousand and twenty feet down stream from the kettle below the fall the Potaro has a fall of eighty-one feet. The brink of the fall is about eleven hundred and thirty feet above sea-level.

The map of Anderson makes the Potaro about thirty miles long to Amatuk, fifteen from Amatuk to the Kaieteur and fifteen from the Kaieteur to Holmia, measured in straight lines; it is twice as long or more following the course of the stream.

The lower Potaro River, from the Kaieteur to near Potaro Landing, follows a northwest to a northeast course, but from Potaro Landing to its mouth the course is from west to east.

At Tumatumari a dike of diabase five hundred yards wide crosses the Potaro and causes the cataract at that point. Various dikes cross the Potaro between Tumatumari and a point two miles above Potaro Landing, but none of these interfere with navigation by launches.

Above the mouth of the Curiebrong,[63] a northern tributary of the Potaro, there are a series of dikes causing the Ichaura Rapids, and the Cobenatuk and Pakatuk Cataracts.

[63] The Curiebrong River, a northern tributary of the Potaro, comes down from the table-land in the Amaila fall, one hundred and forty-four feet high, and then down an inclined plane for two miles to the level of the river below.

Between the Pakatuk Cataract and Amatuk the river is again navigable for small boats. The "Amatuk Falls are over some of the lower beds of the great sandstone and conglomerate formation. Here the sandstone and conglomerate is fine grained, with occasional quartz-pebbles, of a red color, and shows very clearly, and in many places markedly, current-bedding. Not more than about twenty-five feet of the lower beds are exposed in the actual section of the falls. A sill of diabase intrusive through the sandstone causes small rapids above the main fall."

At Waratuk (a few miles above Amatuk) a dike of diabase causes rapids, and as stated, another series of cataracts occurs at Tukeit and between Tukeit and the foot of the Kaieteur.

Above the Kaieteur, for about forty miles as the river flows, the Potaro is navigable to bateaus without interruption. At Aruataima at the end of this stretch is another cataract and beyond this point I did not go.

As stated, one of the chief objects of the expedition was to study the relation of the faunas of the upper to that of the lower Potaro.

The questions of prime importance concerning the fauna of the upper Potaro, *i. e.*, the Guiana Plateau, are:

1. Of what does it consist?
2. Whence did it come?
3. How did it get there?

The first and second of these questions are simplified as to fishes by the obvious fact that fishes live in water, and that most of them die in a few moments after being taken from the water. Their migrations must be along waterways; *i. e.*, along well-defined and restricted channels.

1. Fishes Taken in the Potaro.

The species found both above and below the Kaieteur are given in italics. Those confined to the plateau are in heavy-faced type. These two categories answer specifically the first of the above questions. Species peculiar to the Potaro are marked with an asterisk, those genera peculiar to it with a double asterisk. Those found between the mouth and the cataracts above Potaro Landing are marked A, those between the latter place and Amatuk, B, and those above the Amatuk Cataract, C.

Aspredinidæ.

1. Bunocephalus chamaizelus A B

Siluridæ.

Pimelodinæ.

2.**Megalonema platycephalum A
3. Pseudopimelodus villosus A
4.*Pseudopimelodus albomarginatus C
5.*Brachyglanis frenata B
6.*Brachyglanis phalacra B
7.*Myoglanis potaroënsis A B C

8. Chasmocranus longior A B
9.*Chasmocranus brevior A B
10. *Rhamdia quelen* A (B? C?)
11. Pimelodella cristata A
12. Pimelodella megalops A
13. Pimelodus clarias A
14. Pimelodus ornatus A
15. Doras hancocki A

Doradinæ.

16. Doras cataphractus (A?) B
17. Leptodoras linnelli A
18. Hemidoras carinatus A
19. Hemidoras leporhinus A

Auchenipterinæ.

20. Centromochlus aulopygius A
21.*Auchenipterus brevior A
22.*Agenciosus marmoratus A

HELOGENEIDÆ.

23.**Helogenes marmoratus* C

PYGIDIIDÆ.

Cetopsinæ.

24.*Hemicetopsis macilentus A
25.*Hemicetopsis minutus B

Pygidiinæ.

26.*Pygidium conradi B C
27.*Pygidium gracilior B
28.***Pygidium guianensis**

CALLICHTHYIDÆ.

29. *Callichthys callichthys* (A B C?)
30. Corydoras punctatus A B

LORICARIIDÆ.

Plecostominæ.

31.****Lithogenes villosus**
32. Plecostomus hemiurus (A?) B C
33.****Corymbophanes andersoni**
34. Hemiancistrus megacephalus B C
35.*Pseudancistrus nigrescens
36.*Lithoxus lithoides (A?) B C

Loricariinæ.

37. Loricariichthys brunneus A
38. Loricariichthys platyurus A

CHARACIDÆ.

Curimatinæ.

39. Curimatus spilurus A (B?) C
40. Curimatus microcephalus A B C

Prochilodinæ.

41. Prochilodus rubrotæniatus A

Hemiodinæ.

42. Hemiodus quadrimaculatus A B C
43. Anisitsia notata A

Chilodinæ.

44. Tylobronchus maculosus A B

Nannostomatinæ.

45.*Characidium laterale (A?) B
46.*Characidium vintoni C
47. Characidium blennioides A B C
48.*Nannostomus minimus B
49. Pœcilobrycon erythrurus B
50. Pœcilobrycon ocellatus A

Anostominæ.

51. Anostomus anostomus A B
52. Anostomus plicatus A B
53. Schizodon fasciatus A

Leporininæ.

54.*Leporinus arcus A B C
55. Leporinus nigrotæniatus A
56. Leporinus friderici A B
57. Leporinus maculatus A B C
58. Leporinus alternus A (B?) C
59. Leporinus fasciatus A

Pyrrhulininæ.

60. *Pyrrhulina filamentosa* (A? B C)

Crenuchinæ.

61.****Pœcilocharax bovallii* C

Iguanodectinæ.

62. Iguanodectes tenuis A

Tetragonopterinæ.

63.*Tetragonopterus argenteus A
64. Tetragonopterus caleeus B

65.*_Mænkhausia oligolepis_ A B (C?)
66. Mœnkhausia grandisquamis A B
67. Mœnkhausia chrysargyrea A
68.*_Mænkhausia browni_ A B C
69. Mœnkhausia shideleri A
70. Mœnkhausia lepidurus A B
71. Mœnkhausia cotinho A B C
72. Mœnkhausia colletti A B
73.*Hemigrammus erythrozonus B
74. Hemigrammus orthus (A B?) C
75. Hemigrammus cylindricus A
76. Hyphessobrycon eos B C
77.*Dermatocheir catablepta A
78. _Creatochanes affinis_ A B C
79. Creatochanes caudomaculatus A
80. Creagrutus melanzonus A
81.*Bryconamericus hyphesson A
82. Pœcilurichthys polylepis A
83. _Pœcilurichthys bimaculatus_ (A B C?)
84. Pœcilurichthys abramoides A B
85. Pœcilurichthys potaroënsis B C
86. Astyanax mucronatus A (B?) C
87. Astyanax essequibensis A
88. Astyanax guianensis A
89.*Astyanax mutator
90. Deuterodon pinnatus (A?) B C
91.*Deuterodon potaroënsis A B
92. Phenacogaster microstictus A
93. Phenacogaster megalostictus A B C

Bryconinæ.

94. Holobrycon pesu A
95. Brycon falcatus (A B?) C

Chalcininæ.

96. Chalceus macrolepidotus A

Brachycalcininæ.

97. Fowlerina orbicularis A B

Gasteropelicinæ.

98. Carnegiella strigata A
99. Gasteropelicus sternicla (A B C?)

Serrasalminæ.

100. Serrasalmo gymnogenys A
101. Serrasalmo rhombeus A

Mylinæ.

102. Myloplus rubripinnis A
103. Myloplus rhomboidalis A B
104. Myleus pacu A

Characinæ.

105. Charax gibbosus A
106. Cynopotamus essequibensis A
107. Acanthocharax microlepis A

Acestrorhynchinæ.

108. Acestrorhynchus falcatus A B C
109. Acestrorhynchus microlepis A B

Erythrininæ.

110. Hoplias macrophthalmus A (B?) C
111. _Hoplias malabaricus_ A B C
112. _Hoplerythrinus unitæniatus_ (A B C?)
113. _Erythrinus erythrinus_ A (B?) C

GYMNOTIDÆ.

Electrophorinæ.

114. Electrophorus electricus A

Gymnotinæ.

115. _Gymnotus carapo_ (A B?) C

Hypopominæ.

116. Sternopygus macrurus A B C
117. _Hypopomus brevirostris_ (A B C?)
118. Eigenmannia macrops A
119. _Eigenmannia virescens_ A B
120. Rhamphichthys rostratus A
121. Gymnorhamphichthys hypostomus A.

Sternarchinæ.

122. Sternarchorhynchus oxyrhynchus (A?) B
123. Porotergus gymnotus B
124. Sternarchus leptorhynchus B
125. Sternarchus albifrons A

PŒCILIIDÆ.

126.*Rivulus breviceps C
127.*Rivulus waimacui B C
128.*Rivulus holmiæ

BELONIDÆ.

129. Potamorrhaphis guianensis A

SCIÆNIDÆ.

130. Pachyurus schomburgki A

CICHLIDÆ.

131. Nannocara bimaculata B
132.*Æquidens geayi A B
133. *Æquidens potaroënsis* A B C
134. Cichlasoma severum B
135. Geophagus surinamensis A
136. Biotodoma cupido A
137. *Heterogramma ortmanni* (A?) B (C?)
138. Heterogramma steindachneri A
139. Cichla ocellaris A
140. *Crenicichla alta* A B C
141. Crenicichla wallacei A
142. Crenicichla lugubris A B C
143. Crenicichla johanna A

SOLEIDÆ.

144. Achiurus lineatus A
145.**Seleonasus finis A

Of these, *Pœcilurichthys bimaculatus, Hypopomus brevirostris,* and *Callichthys callichthys* have not been taken in the Potaro below the Kaieteur, but, inasmuch as they are found on the plateau and in the Essequibo, they probably also occur in the lower Potaro, and are so rated.

The table on page 99 summarizes the different categories in the preceding list.

In this table the first column represents the species found below the Kaieteur, and it will be seen that while there are one hundred and forty species found in this part of the river, there are but twenty-three above the Kaieteur.

It is, however, not fair to compare the fauna of the plateau with the fauna of the entire lower Potaro, because the fishes of the Essequibo can easily ascend to Tumatumari. The cataract at Tumatumari is probably not an effective barrier to many fishes. There is a more difficult series of cataracts between Potaro Landing and Kangaruma, and another cataract at Amatuk. The cataract at Waratuk, like that of Tumatumari, may be left out of account. By comparing the fauna as determined in the three lower divisions of the Potaro it is seen that only seventy-six species (B and C) are found above Kangaruma. The rest, with very few exceptions, are fishes of the lower and middle Essequibo. Evidently species that are not able to ascend the Potaro Landing cataracts need not be expected on the plateau.

By further restricting the vision we find that only thirty-six species have so far been taken above the Amatuk Cataract. This is certainly not all of the species found in this area, but the number indicates that there is a distinct reduction in the number of species as compared with the Potaro at Tumatumari.

Further investigations should be made of the fauna of the Potaro above the Amatuk cataract and above the Kaieteur. Eight species found above the Kaieteur and in the Essequibo, but not taken in C, should probably be added to the thirty-six actually captured. It would seem from these lists that the groups extending to the base of the Kaieteur, but not found above it, are the Curimatinæ, Hemiodinæ, Nannostomatinæ, Leporininæ, Bryconinæ, Gasteropelicinæ and Acestrorhynchinæ.

	Species Below the Kaieteur.	A	B	C	Species Above the Kaieteur.
Aspredinidæ	1	1	1	0	0
Siluridæ:					
Pimelodinæ	13	10	5(6?)	2(3?)	1
Doradinæ	5	4(5?)	1	0	0
Auchenipterinæ	2	0	0	0	0
Ageneiosinæ	1	0	0	0	0
Helogenidæ	1	0	1	1	1
Pygidiidæ:					
Cetopsinæ	2	1	1	0	0
Pygidiinæ	2	0	2	1	1
Callichthyidæ	2	1	1	0	1
Loricariidæ:					
Plecostominæ	4	(2?)	4	3	2
Loricariinæ	2	0	0	0	0
Characidæ:					
Curimatinæ	2	2	1(2?)	2	0
Prochilodinæ	1	1	0	0	0
Hemiodinæ	2	2	1	1	0
Chilodinæ	1	1	1	0	0
Nannostomatinæ	6	2(3?)	5	1	0
Anostomatinæ	3	3	2	0	0
Leporinæ	6	6	3(or 4?)	3	0
Pyrrhulininæ	1	(1?)	1	1	1
Crenuchinæ	1	0	0	1	1
Iguanodectinæ	1	1	0	0	0
Tetragonopterinæ	30	23(26?)	12(15?)	9(11?)	5
Bryconinæ	2	1(2?)	0(1?)	1	0
Chalcininæ	1	0	0	0	0
Brachycalcininæ	1	1	0	0	0
Gasteropelicinæ	2	1(2?)	(1?)	(1?)	0
Serrasalminæ	2	0	0	0	0
Mylinæ	3	1	0	0	0
Characinæ	3	0	0	0	0
Acestrorhynchinæ	2	2	2	1	0
Erythrininæ	4	3(4?)	1(4?)	2(4?)	3
Gymnotidæ:					
Electrophorinæ	1	0	0	0	0
Sternarchinæ	4	1(2?)	3	0	0
Hypopominæ	6	5(6?)	2(3?)	1(2?)	2
Gymnotinæ	1	(1?)	(1?)	1	1
Pœciliidæ	2	0	1	2	1
Belonidæ	1	1	0	0	0
Sciænidæ	1	1	0	0	0
Cichlidæ	13	10(11?)	7	3(4?)	3
Achiridæ	2	2	0	0	0
	140	87(102?)	58(71?)	36(44?)	23

2. Whence did the fauna of the plateau come?

   A. Is it the nucleus of the original fauna of Guiana? Or

   B. Have the faunas on the plateau and the lowland developed from a common nucleus? Or

   C. Is it a relict of a more abundant modern fauna? Or

   D. Does it consist of recent immigrants? Or

   E. Is it a mixture?

To assist in answering these questions I give the species of the plateau with their distribution in the Potaro and also their general distribution in South America.

		Coastwise Streams.	Demerara.	Essequibo.	Tumatumari.	Potaro Landing.	Kangaruma.	Erukin.	Amatuk.	Waratuk.	Tukeit.	Savannah Landing.	Holmia.	Aruataima.	Maripicru.	Chipoo.	Niekaparoo.	Amazon.	La Plata.	San Francisco.
1.	Rhamdia quelen	...	...	...	...	1	...	...	...	...	...	...	13	41	...	3	8	×	×	...
2.	Helogenes marmoratus	...	?	...	...	×	...	...	...	...	14	...	19	15	...	...	...	...	...	...
3.	Pygidium guianensis	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...
4.	Callichthys callichthys	...	15	7	...	...	...	...	...	...	...	...	10	...	...	1	1	×	×	...
5.	Lithogenes villosus	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...
6.	Corymbophanes andersoni	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...
7.	Pyrrhulina filamentosa	365	95	40	...	...	...	2	...	...	7	50	104	35	14	...	...	×	...	...
8.	Pœcilocharax bovallii	...	...	...	...	...	...	...	...	...	63	220	3	...	...	...	...	...	...	...
9.	Mœnkhausia oligolepis	...	...	...	8	1	...	3	...	...	7	41	41	...	1	...	...	×	?	...
10.	Mœnkhausia browni	...	...	...	1	...	...	...	2	...	9	69	38	1	...	...	...	...	...	...
11.	Creatochanes affinis	...	6	4	47	5	...	...	6	...	27	8	45	9	30	...	...	×	...	...
12.	Pœciluriehthys bimaculatus	233	...	...	...	...	...	...	...	...	...	...	5	...	1	...	...	×	×	×
13.	Astyanax mutator	...	...	...	...	...	...	...	...	...	...	121	...	...	...	...	...	...	...	...
14.	Hoplias malabaricus	72	7	18	...	1	...	...	12	1	...	4	9	2	...	3	...	×	×	×
15.	Hoplerythrinus unitæniatus	15	...	8	...	...	...	...	...	...	...	2	8	10	...	...	1	×	×	...
16.	Erythrinus erythrinus	...	4	15	...	2	...	...	...	...	10	3	37	9	...	...	16	×	...	...
17.	Gymnotus carapo	12	12	11	...	...	...	...	...	...	30	...	34	15	1	1	32	×	×	×
18.	Hypopomus brevirostris	4	1	1	...	...	...	...	...	...	...	2	...	...	...	2	4	×	×	...
18*a*.	Eigenmannia virescens	181	35	5	...	2	1	...	...	...	...	1	...	...	3	5	...	×	×	×
19.	Rivulus holmiæ	...	...	...	...	...	...	...	...	...	...	...	18	...	...	...	...	...	...	...
20.	Æquidens potaroënsis	...	...	2	...	1	4	3	17	1	25	27	33	5	...	...	...	...	...	...
21.	Heterogramma ortmanni	...	...	16	...	...	1	46	...	...	...	...	1	...	...	...	...	×	?	...
22.	Crenicichla alta	...	...	35	...	2	...	2	...	...	4	2	9	8	...	...	...	9	?	...

The numbers in the respective squares show the number of specimens taken and thus indicate the relative abundance of the species at each place.

An analysis of this list shows three groups of species.

a. Very widely distributed species: 1, 4, 7, 9, 11, 12, 14, 15, 16, 17, 18, 21. All of these are found in the neighboring river Ireng, of the Amazon basin. All of these are also found below the Kaieteur, but in different proportions. The percentage of the total fauna of the plateau formed by this group is 56.60.

b. Peculiar species of very widely distributed genera.

(1) Confined to the plateau: 3, 13, 19 = 13.01 per cent.

(2) Found also below the Kaieteur: 10, 20, 22 = 13.01 per cent.

c. Peculiar genera and species.

(1) Peculiar to the plateau: 5, 6 = 8.69 per cent.

(2) Found both above and below the Kaieteur, but confined to the Potaro (?): 2, 8 = 8.69 per cent.

A. If this fauna is the nucleus of the original undifferentiated fauna of South America we are at once confronted by the fact that 56.60 per cent. of the species are identical with species now found everywhere, and 26.02 per cent. consist of species belonging to genera of the widest distribution in South America. The

Fig. 23. Table showing Distribution of the Fishes taken by C. H. Eigenmann in the Potaro River above the Kaieteur Falls. (No. 18a, mentioned in the table above, should have been added. It was overlooked in preparing this figure.)

great improbability that so many species should have retained their identity since the early tertiary, or should have diverged only in minor specific characters, disposes of the theory that this fauna as a whole is the nucleus of the original South American fauna. The number of species peculiar to the plateau forms a larger percentage than a corresponding list for the entire Potaro below the Kaieteur, but not too large to be readily accounted for by the easy access to the Lower Potaro possessed by all the species of the Essequibo. Such easy access tends to lower the percentage of uniques.

The percentage of peculiar species above the Potaro Landing is about the same as for the plateau, and in actual numbers almost equal to the entire fauna of the plateau.

B. The same facts also dispose of the notion that this fauna as a whole may have developed concomitantly with the lowland fauna from a common nucleus. If it had so developed, we could not expect so large a percentage to be identical.

C. Is this poverty-stricken fauna the relict of a more abundant and divergent fauna, dating from a time when the plateau may have been easily accessible to the present diverse fauna of the lowland?

If it is such a relict the fact implies:

(*a*) That at some time in the past, when the plateau was more easily accessible than now, in fact formed part of the general level, it shared the fauna of the region with the general level.

(*b*) That the fauna became isolated by the gradual elevation and formation of the plateau, and of the falls in its rivers.

A simple isolation will not account for all the facts. To account for the poverty we must assume either that the isolation took place before the origin of the present variety in the lowland, or that conditions altered so that most of the great variety of the lowland became extinct. The first horn of this dilemma assumes that the fauna as a whole is a relict of the original fauna, which we have shown to be most improbable. I am not prepared to satisfactorily deal with the other horn of the dilemma. The elevation at the present time is not sufficient to exclude these various lowland types. I do not know of any evidence that other unfavorable conditions have obliterated the fauna of the plateau.

D. Does the fauna consist of recent immigrants?

If it consists of recent immigrants only, we must assume that the plateau became isolated before the origin of the fauna of the lowland, or again, that at some time it became elevated to such a height that practically the entire fauna was wiped out, and later restored by immigrants. Assuming that one or the other of these alternatives is a fact, we may discuss the possibility of the immigration of species.

In this connection the word "migration" as applied to fishes needs definition. It is applied to such journeys as that of the eel to the ocean, or that of the salmon toward the headwaters, for purposes of reproduction. Such trips, although very long, probably only incidentally influence the dispersal of fishes. On the other hand, some species are natural pioneers, found always in the rivulets of the headwaters, as far up as they can get. If the headwater is advanced a few feet, they advance with it. Their migration from one system to another is not miraculous. To find such fishes on opposite sides of a low water-shed presents no mystery. If by a sudden freshet two rivulets join for but a short time, these species are present

to take advantage of the temporary union, and frequently do take advantage of it. Such species usually have a very wide distribution.

In other regions where falls as high as the Kaieteur are the only means of migration, they are effective barriers to the *downward* as well as upward migration of fishes. It would seem, however, from examining the distribution in the preceding list of species 2, 8, 9, 10, and 20, that in some way or other fishes succeed in getting down from the plateau. Some of these species, especially 2, 8, and 10, are abundant above the fall, while below it they were taken at Tukeit only, or but a few miles farther down the river. They are evidently fishes of the plateau which in some way have made their way down.

In contrast to these we have the species numbered 1, 4, 7, 9, 11, 12, 14, 15, 16, 17, 18, 18a, and 21, abundant everywhere below, but also found on the plateau.

These species probably came up from below. They certainly did not ascend the Kaieteur. The fact that a number of species got down may imply unknown means of ascent and descent near the Kaieteur. Whether any of them ascended from the side of the Amazon I cannot say. It is quite probable, as all are found in the Amazon.

The method of ascent of vertical walls by members of the genus *Rivulus*, one of which is found on the plateau, is of great interest. One of these fishes taken in Shrimp Creek jumped against the vertical face of a huge rock and clung by the adhesion of its tail. *From this point by another flop it made and clung to a point much higher up the face of the rock.* I do not know how high this genus would be able to climb a vertical wall. It certainly would not be able to ascend the face of the Kaieteur, but there may be smaller rivulets up one of which it might have made its way.

The fact that a very large part of the fauna consists of species of the widest distribution, or of local species of genera of the widest distribution, *seems to make the recent settlement of the plateau by some of the species certain.*

E. Whether or not the fauna is a mixture, the genera and species of the remaining group "e," *i. e., Lithogenes villosus, Corymbophanes andersoni, Helogenes marmoratus*, and *Pœcilocharax bovallii* should answer.

Now *Corymbophanes* differs from *Plecostomus* in trifling characters only. The genus *Plecostomus* is one of the widely distributed genera of South America, being found on both slopes of the Andes and from Panama to Buenos Aires. *Corymbophanes* may therefore be a local modification of a comparatively recent immigrant to the plateau.

Helogenes marmoratus, on the other hand, is found in the Essequibo basin

only. It is a very aberrant *Nematognath*, with no relatives in other parts of South America. It may be a remnant of the original forms.

Pœcilocharax stands alone in the *Characinæ*, its only near relative being *Crenuchus*, found in the Essequibo and Amazon. It also may be a left-over.

This leaves *Lithogenes villosus* the only genus of the *Loricariidæ* with the armature reduced to a few prickles. Whether we regard this nakedness as primitive or as secondarily acquired it points to a long separation from the other *Loricariidæ*, and *Lithogenes* may also be a left-over.

The evidence seems, then, to favor the conclusion that the larger part of the fauna of the upper Potaro has been more or less recently acquired, and that a smaller part is composed of relicts of the original fauna of the Guiana Plateau. This conclusion is, however, but tentative. Nothing is known about the fauna or physical condition of the rest of the Guiana plateau except what follows under the next head. The only other collections made were those of Richard Schomburgk, and they were all lost. It is highly desirable, therefore, to collect about Roraima, in the streams flowing in different directions.

Fishes of the Ireng River.

The following list may serve as a cross-reference to the preceding list of the Upper Potaro. The names of species common to the Potaro and the Ireng are here italicized. The Maripicru is a branch of the Ireng between Wontyke and Karakara above the Karona Falls. Chipoo is between Karakara and the Rupununi and is probably below the Karona Falls. The location of Nickaparoo was not given me.

The total list of species suggests that we may expect to find a number of additional species in the Upper Potaro.

	Maripicru.	Chipoo.	Nickaparoo.
1. Chasmocranus longior	3		
2. *Rhamdia quelen*		3	8
3. Trachycorystes galeatus		4	
4. *Callichthys callichthys*		1	1
5. Hoplosternum thoracatum		1	
6. Plecostomus hemiurus	2		
7. Ancistrus temminckі	1	2	
8. Ancistrus cirrhosus.[1]			
9. Loricariichthys stewarti		12	
10. Prochilodus maripicru	3		
11. Parodon bifasciatus	1		
12. Chilodus punctatus			1
13. Characidium fasciatum	21		
14. *Pyrrhulina filamentosa*			14
15. Leporinus granti	9		

[1] Near Holmia.

16. Aphyocarax erythrurus	1		
17. *Mœnkhausia oligolepis*	1		
18. *Creatochanes affinis*	35		
19. *Pœcilocharax bimaculatus*	1		
20. Hoplias macrophthalmus	2		
21. *Hoplias malabaricus*		3	3
22. *Hoplerythrinus unitæniatus*			1
23. *Erythrinus erythrinus*			16
24. *Gymnotus carapo*	1	1	32
25. *Eigenmannia virescens*	3	5	
26. *Hypopomus brevirostris*		2	4
27. Æquidens geayi	1		
28. *Æquidens potarcënsis*[1]			
29. Cichlasoma bimaculatum		2	
30. Heterogramma steindachneri		2	
31. *Crenicichla alta*			9

[1] Near Holmia.

CHAPTER VII.

GENERAL CONSIDERATIONS.

A number of interesting and important facts, bearing on general biological problems, are incidentally dealt with in the systematic portion of this paper. Inasmuch as it is not at all to be expected that anyone would read through the mass of details to discover them they are extracted and presented here.

"Unnatural Natural History."

The skeletons of a variety of the *Ariinæ* are prepared and sold as "crucifix fishes." The one which is most frequently prepared is *Sciadeichthys proöps* (Plate VI). The dorsal surface of the skull and dorsal plate are pointed out as resembling a hooded monk with outstretched arms. The ventral surface resembles the cross. Fancy pictures the dorsal spine as a representation of a spear, while the otoliths, which rattle when the skull is shaken, are the dice with which the soldiers cast lots for the garment of our Lord.

Skulls of the *Aspredininæ* are put together to form a "crown of thorns."

Jordan's Law.

If we should find specimens of any group with such slight differences as there are between *Crenicichla saxatilis* and *alta* or *Æquidens vittatus* and *potaroënsis* generally present at any locality we should probably consider them as variations without special significance. The differences must, however, be of distinct significance, if they are coördinated with the environment in such a way that one can predict what the form will be at any locality.

In the present paper such forms have been given specific designation. Thus *Æquidens vittatus* of the lowlands is replaced by *Æquidens potaroënsis* in the Potaro River, both above and below the Kaieteur. Similarly *Crenicichla alta* replaces *Crenicichla saxatilis*, the two forms overlapping at Rockstone. Similar replacements of lowland species by highland species are abundant. *Rhamdia quelen* of the upper Potaro replaces *Rhamdia sebæ* of the lowland. *Helogenes marmoratus* replaces *Hypophthalmus edentatus*. *Plecostomus hemiurus* replaces *Plecostomus*

watwata of the lower courses. *Mænkhausia browni* replaces *Mænkhausia grandisquamis*, *Creatochanes affinis* replaces *Creatochanes melanurus*, *Chalcinus rotundatus* replaces *Chalcinus elongatus*, *Charax rupununi* replaces *Charax gibbosus*, *Pimelodella cristata* and *P. megalops* replace *P. macturki*.

In a number of other places the replacement is not so conspicuous. In several of the above mentioned cases the species overlap. In some of the cases there is quite evident genetic connection between the two mutually excluding forms. In other cases the genetic connection, while evident, is certain y remote, as in the case of *Crenuchus* and *Pœcilocharax*, for instance, and in still other cases the relation may be apparent rather than real, *i. e.*, one or both forms may have immigrated to adapted localities, and not have become differentiated in their present habitat.

In so far as two of the above pairs represent local adaptations, that is, in so far as one or both members of the pair are autochthons, thus far do they give evidence in support of Jordan's Law. Where, however, we find such cases in support of the law, there are many others where the more closely related species occupy the same territory and are contrary to it. We may cite *Phenacogaster megalostictus* and *microstictus; Chasmocranus longior* and *brevior; Doras hancocki* and *cataphracta; Curimatus microcephalus* and *spilurus; Characidium pellucidum, C. pteroides* and *C. catenatum; Pœcilobrycon trifasciatus, P. erythrurus* and *P. ocellatus*. It may be said in favor of Jordan's Law that in some of the cases in which we are certain that the forms are immediately related (*Crenicichla* and *Æquidens*) its postulates are undoubtedly sustained.

Mutation.

Two instances of apparent mutation may be mentioned.

1. *Mænkhausia profunda* differs from *Fowlerina orbicularis* apparently only in the generic characters. I say apparently, for it is to be borne in mind that in comparing "specimens" of fishes we are put on a level with the ornithologist who might be compelled to compare plucked specimens of the Orchard and Baltimore Orioles. It is doubtful whether he would draw correct conclusions as to their song and nesting-habits from such data. Similarly *Mænkhausia profunda* and *Fowlerina orbicularis* may differ from each other much more than the characters of specimens seem to indicate. Granting that the two species are as similar as they appear to be it is quite probable that the former is a recent mutant of the latter. *Fowlerina* is exceedingly abundant in the Essequibo. *Mænkhausia profunda* is known by but two specimens from the northwestern coast. (Plate XLVI, figs. 1 and 2.)

2. The second instance is complex and indicates simultaneous, orthogenic mutation in a number of not closely related species of the same family.

In different species of the *Nannostomatinæ*, *Tetragonopterinæ* and the *Characinæ* the pectoral has at times been arrested in its normal development. It has retained the embryonic form. Inasmuch as I had never seen a similar condition in other fishes the first specimen was described as a distinct genus. Mrs. Ellis at once found another. Mrs. Ellis then made a systematic search for similar mutants in the large collections made, not only by myself, but also among the *Tetragonopterinæ* collected by Mr. Haseman in various parts of Brazil. She reports:

The specimens with an archaic pectoral were forty-four in number, belonging to eight different species of five different genera and three different subfamilies, as follows:

Archicheir minutus Eigenmann, one specimen, 26 mm., Christianburg (Carnegie Museum Catalog of Fishes No. 1186).

Dermatocheir catablepta Durbin, one specimen, 18 mm., Tumatumari, British Guiana (C. M. Cat. No. 1198).

Hyphessobrycon parvella Mrs. Ellis, one specimen, 18 mm., Riberao, Azula Lagoa (C. M. Cat. No. 2930); one specimen, 12 mm., Rio Tieté (C. M. Cat. No. 2931), with archaic pectorals. Thirteen specimens, 13 to 29 mm. (No. 2932), Aqua Quente, Alagoinhas, Rio Catu, Queimadas, Rio Itapicurú, have normal pectorals.

Hyphessobrycon lütkeni (Boulenger), four specimens, 12, 16, 16, and 19 mm. (without the caudal), Jacarehy (C. M. Cat. No. 2933), have archaic pectorals. Three specimens, 19, 19, and 20 mm. (without the caudal), Jacarehy, (No. 2937), have normal pectorals. The pectorals are also normal in thirteen hundred and seventy-four specimens, 23 to 65 mm., from Rio Grande do Sul, Paraguay basin, and the coastwise streams of southern Brazil.

Hyphessobrycon bifasciatus Mrs. Ellis, twenty-seven specimens, 15–25 mm., Cacequy (C. M. Cat. No. 2935); and five specimens, 18 to 27 mm., Munez Freire (C. M. Cat. No. 2936), have archaic pectorals, while one hundred and eighty-four specimens, 25 and 29 to 47 mm., from Campos, São João da Barra, Xiririca, Porto Alegre, Morretes, Munez Freire, Lagoa Feia, and Cacequy have pectorals of the adult type.

Hasemania maxillaris Mrs. Ellis, one specimen, 29 mm., from Porto União, Rio Iguassú (C. M. Cat. No. 2937).

Hasemania bilineatus Mrs. Ellis, four specimens, 14 to 16 mm., from Mogy das Cruzes, Rio Tieté (C. M. Cat. No. 2938) have archaic fins; five specimens, 20 to 41 mm. (2939), from Mogy das Cruzes, Alto da Serra, São Paulo, have normal pectorals.

Charax gibbosus (Linnæus), four specimens, 29 to 33 mm., Botanic Garden, near Georgetown, British Guiana (C. M. Cat. No. 2940).

Asiphonichthys hemigrammus Eigenmann, two specimens, 27 mm., Gluck Island (C. M. Cat. No. 2138, I. U. Cat. No. 12044); one specimen, 25 mm. (without the caudal), Gluck Island (I. U. Cat. No. 12645), have archaic pectorals. One specimen, 33 mm. (with the caudal), Gluck Island (C. M. Cat. No. 2941), has a normal pectoral.

In contrast to the species of *Hyphessobrycon* enumerated above we have one thousand nine hundred and ninety-nine specimens of *Hyphessobrycon gracilis* between 19–30 mm., all with normal fins.

Whether any of the forms here enumerated are permanent, or simply abnormal individuals, doomed to elimination, the interesting fact remains that a very unusual mutation is arising simultaneously in widely different members of the same family. This is of special interest in the case of the characins, for it seems quite certain that other characters have independently made their appearance in different subfamilies. A pair of conical teeth in the lower jaw belongs to this category. They are found in widely distinct subfamilies both in Africa and America. A triple series of teeth in the maxillary is another character that has been several times and independently derived from a double series, and the double series from a single series. The steps in this process have been preserved in part. The process in the latter cases is again orthogenic, but it is doubtful whether progress is made by mutation.

Changes of Color and Shape with Age.

Marked changes in color take place with growth in *Cichla*. Only melanism is taken into account. In the smaller specimens there is a series of three conspicuous spots on the sides (Plate LXIX, fig. 1). These become ocellated a little later, at the same time that vertical dark bands appear (fig. 2). With growth the two anterior spots disappear entirely, the last one being retained as a caudal ocellus (fig. 3). The sides are marked at this stage with three heavier, and a number of fainter, cross-bands. With full growth the bands become concentrated into irregular spots surrounded by lighter (fig. 4).

Changes in the color of *Crenicichla alta* are sufficiently described in the diagnosis of the species.

The changes in color in *Myloplus rhomboidalis* and *Myleus pacu* are indicated in Plates LVIII and LIX. In the figure of the adult *M. pacu* irregular black blotches, which are frequently present, are not indicated. In both these species there is a notable change in shape with age. The young are much slenderer, depth 2.6 in

the length in the young *M. pacu*, as compared with 1.6 in the adult; 2.4 in the length in the young *Myloplus rhomboidalis* as compared with 1.5 in the adult. Similar changes in shape take place in *Serrasalmo rhombeus* and probably in all of the other characins with an extremely deep body In this connection figures 2 and 3 of Plate LII should also be examined; they represent the change in shape in another type of characins.

On the Utilization of Different Structures to Obtain the Same End.

(Plates V–IX.)

In a number of *Siluridæ*, especially the marine *Ariinæ*, the nuchal region is heavily armored. Granting that this armor is an adaptation, it is of interest that it is formed of *either* the occipital process, the so-called dorsal plate, *or* combinations of the two in varying proportions.

In *Sciadeichthys flavescens* (Plate V, fig. 1) the entire armature is furnished by the dorsal plate. In *proöps* (Plate V, fig. 2) the occipital process takes a slight part, the major portion of the armature being formed by the dorsal plate. In *parkeri* (Plate V, fig. 3) the occipital process is still more prominent. In *Sciadeichthys emphysetus* (Plate IX, fig. 1) the dorsal plate and occipital process are of about equal value. In the two species of *Selenaspis*, *S. herzbergii* and *S. passany* (Plate VII) the occipital process is slightly larger than the dorsal plate. In *Arius spixii* and *Hexanematichthys rugispinis* (Plate IX) the dorsal plate forms a negligible portion of the armature. It is still further reduced in the three species of *Notarius* (Plate VIII) in which the occipital process differs progressively from the linear form in *N. stricticassis* to the leaf-shaped in *N. grandicassis*. In the latter three species there is very great variation.

The series outlined above is not a genetic series. It is simply a series showing the inversely proportioned coördinated development of the structures to accomplish the arming of the nuchal region. They illustrate the dictum of Weismann that "adaptations arise if they are at all possible" and that the structures utilized in bringing out the adaptation are not material. Natural selection would be satisfied with the arming of the nuchal region regardless of the structure that did the arming.[64]

A similar case is furnished by the genera *Charax*, *Asiphonichthys*, *Acanthocharax* and *Heterocharax*. In these a spinous armor for the lower gill-region, or breast, may be considered an adaptation. In the first two genera the *clavicle* furnishes the spine. Its lower edge rises blade-like and ends in a spine anteriorly and pos-

[64] Dr. C. R. Eastman calls my attention to the fact that a similar armoring has developed in *Coccostcus*, *Dinichthys*, and other extinct fishes.

teriorly. In the latter two genera the clavicle is free from spines, but the *preopercle* is provided with a spine at its lower angle. Granted that the presence of a spine was advantageous at this point, it is evident that natural selection might preserve two different lines of individuals which varied in this direction.

Mutilation.

Mutilated specimens which would not have survived, if there were the close individual selection and elimination which we have imagined, are not rare.

A *Potamotrygon* evidently had a piece bitten out of the side by a "Perai." An *Astyanax abramoides* had a mutilated snout of long standing, although it was the largest specimen of the species obtained.

A *Loricaria brunnea* had lost the posterior portion of the body and had regenerated a caudal fin. A *Trachycorystes obscurus* had suffered a similar injury and regenerated the caudal. Several specimens of *Charax gibbosus* and *Eigenmannia virescens* had suffered a variety of injuries. A detailed study of the mutilations in the gymnotid eels will be published in a monograph on the *Gymnotidæ*, which has been prepared by Dr. Max Ellis, and which will shortly appear in the Memoirs of the Carnegie Museum.

The Characins.

This family will be fully dealt with in another place, but a few of the new points brought out by the present expedition may be mentioned.

More than half of the strictly fresh-water fauna of Guiana is composed of characins. In all there are one hundred and fifty-one species. In all localities, except Lama Stop-Off, the Georgetown trenches, Waratuk, the Packeoo Falls, and the Rupununi and Aruataima, they form more than half the number of species. It was found that some of the small species (Plate XXXIX, figs. 3–7) burrow on the sand-banks like some of the North American darters, and that some species actually fly for a short distance after scooting along the surface of the water for a much longer distance. The characins are thus found in the bottom below the river and in the air above it. It has long been known that different members are adapted to, and live in, all the regions between the two.

The organs of flight, which have been the subject of study by one of my students, consist of the enlarged pectorals and the hypertrophy of the attached muscles. To furnish points of origin for the muscles the coracoids are enormously expanded and united below into a sternum. The entire anatomy of the anterior half of the fish has been modified to become adjusted to this peculiar structure. (Plate LV.)

I have elsewhere called attention to the fact that the characins parallel most other fishes. For this reason they were distributed by the earlier naturalists among various families of fishes. *Pœcilocharax*, a small species about the Kaieteur, looked so nearly like a *Pœciliid* that only careful scrutiny after my arrival at home enabled me to place it where it belongs. (Plate XLIV.) Not only do they parallel other species of fishes, but they parallel each other. *Mœnkhausia lepidurus* "mimics" *Creatochanes caudomaculatus*, which frequently lives with it. The young of *Anostomus anostomus* (Plate XLI, fig. 1) so closely resemble the young of *Leporinus arcus* (Plate XLII, fig. 2) that a most skilled ichthyologist pronounced them the same when the snouts of the two specimens were covered. Some idea of the diversity in this family may be gathered by glancing at the plates from Numbers XXXIII to LXI. The most interesting discovery was probably *Bivibranchia*, a characin with a protractile upper jaw (Plate XXXIII) and of nearly equal interest was the discovery of the sexually dimorphic *Pœcilocharax* (Plate XLIV, figs. 1 and 2).

Of more general interest was the finding of the young of the "Pacu" in the Waraputa Cataract and elsewhere. The breeding-place of this important food-fish was not known, and it had been supposed that it bred on the overflowed land during the rainy season.

Sexual Dimorphism.

Color differences are as common between the sexes of fishes in Guiana as elsewhere, but it is not the intention to take up these. Red and yellow are frequently present.[65] Usually if yellow and red are present in a species the red replaces in the male the yellow of the female.

The secondary sexual differences of the *Pœciliidæ* are varied and great. They have often been described, but none of those hitherto described approaches the modification in the male of *Tomeurus*. (Plate LXV, figs. 7 and 8.) The anal fin in this species has been moved further forward and is more highly modified than in any other member of the family. In *Rivulus* (Plate LXIII) the *female* has an ocellus on the base of the upper caudal lobe. (See also Plates LXIV and LXV for other instances of sexual differences in the *Pœciliidæ*.)

Great secondary sexual characters are also found in the "Pacu," *Myleus*, and probably in all of the related species of *Myloplus*. The anal fin in the male is bilobed (Plate LIX, fig. 5), the middle rays longer than those either just in front or behind them. The anal of the female is falcate (Plate LIX, fig. 6).

[65] In *Hyphessobrycon* and *Hemigrammus* the red of the caudal frequently encroaches on the sides of the body. The red markings are sometimes very abrupt, as in the caudal of *Cichla ocellaris*, and in the fins of *Chalceus macrolepidotus*.

The difference between the male and female of *Pœcilocharax* are indicated on Plate XLIV, figures 1 and 2.

In some of the *Loricariidæ* the male is more abundantly supplied with spines. In *Pseudancistrus barbatus*, for instance, the cheeks of the males are provided with long bristles. In *Lithoxus lithoides* the pectoral spines are much longer in the male (Plate XXIX, fig. 4) than in the female (fig. 3) and more profusely provided with bristles.

The peculiar barbels, much more profusely developed on the head of the male *Ancistrus* than on the female, have long been known (Plate XXV, fig. 3).

New Genera and Species.

The new genera described during the progress of the work are:

1. *Chamaigenes.*
2. *Agmus.*
3. *Megalonema.*
4. *Microglanis.*
5. *Brachyglanis.*
6. *Leptoglanis.*
7. *Myoglanis.*
8. *Chasmocranus.*
9. *Tympanopleura.*
10. *Lithogenes.*
11. *Corymbophanes.*
12. *Lithoxus.*
13. *Bivibranchia.*
14. *Tylobronchus.*
15. *Pœcilobrycon.*
16. *Archicheir.*
17. *Pœcilocharax.*
18. *Aphyodite.*
19. *Dermatocheir.*
20. *Carnegiella.*
21. *Acanthocharax.*
22. *Heterocharax.*
23. *Gymnorhamphichthys.*
24. *Porotergus.*
25. *Rhinosardinia.*
26. *Tomcurus.*
27. *Acarichthys.*
28. *Solconasus.*

The new species of fresh-water fishes, based on the collections made, are:

1. *Bunocephalus amaurus.*
2. *Bunocephalus chamaizelus.*
3. *Agmus lyriformis.*
4. *Megalonema platycephalum.*
5. *Pseudopimelodus villosus.*
6. *Pseudopimelodus albomarginatus.*
7. *Microglanis pœcilus.*
8. *Brachyglanis frenata.*
9. *Brachyglanis melas.*
10. *Brachyglanis phalacra.*
11. *Leptoglanis essequibensis.*
12. *Myoglanis potaroënsis.*
13. *Chasmocranus longior.*
14. *Chasmocranus brevior.*
15. *Pimelodella megalops.*
16. *Pimelodella macturki.*
17. *Pimelodus heteropleurus.*
18. *Leptodoras linnelli.*
19. *Hemidoras microstomus.*
20. *Hemidoras micropæus.*
21. *Hemidoras leporhinus.*
22. *Hemidoras notospilus.*
23. *Auchenipterus demeraræ.*
24. *Auchenipterus brevior.*
25. *Tympanopleura piperata.*
26. *Agenciosus guianensis.*

27. *Ageneiosus marmoratus.*
28. *Hemicetopsis macilentus.*
29. *Hemicetopsis minutus.*
30. *Pygidium guianense.*
31. *Pygidium conradi.*
32. *Pygidium gracilior.*
33. *Plecostomus hemiurus.*
34. *Lithogenes villosus.*
35. *Corymbophanes andersoni.*
36. *Hemiancistrus braueri.*
37. *Pseudancistrus nigrescens.*
38. *Lithoxus lithoides.*
39. *Loricariichthys microdon.*
40. *Loricariichthys griseus.*
41. *Loricariichthys stewarti.*
42. *Farlowella hargreavesi.*
43. *Bivibranchia protractila.*
44. *Curimatus morowhannæ.*
45. *Curimatus issororoënsis.*
46. *Prochilodus maripicru.*
47. *Tylobronchus maculosus.*
48. *Paradon bifasciatus.*
49. *Nannostomus marginatus.*
50. *Nannostomus minimus.*
51. *Nannostomus simplex.*
52. *Pœcilobrycon harrisoni.*
53. *Pœcilobrycon erythrurus.*
54. *Pœcilobrycon occllatus.*
55. *Archicheir minutus.*
56. *Characidium laterale.*
57. *Characidium vintoni.*
58. *Characidium blennioides.*
59. *Characidium pellucidum.*
60. *Characidium pteroides.*
61. *Characidium catenatum.*
62. *Anostomus plicatus.*
63. *Schizodontopsis laticeps.*
64. *Leporinus arcus.*
65. *Leporinus granti.*
66. *Leporinus alternus.*
67. *Pœcilocharax bovallii.*
68. *Aphyocharax melanotus.*
69. *Aphyocharax erythrurus.*
70. *Aphyodite grammica.*
71. *Mœnkhausia profunda.*
72. *Mœnkhausia browni.*
73. *Mœnkhausia shidleri.*
74. *Pristella aubynei.*
75. *Hemigrammus erythrozonus.*
76. *Hemigrammus rodwayi.*
77. *Hemigrammus iota.*
78. *Hemigrammus orthus.*
79. *Hemigrammus cylindricus.*
80. *Hemigrammus analis.*
81. *Hyphessobrycon minor.*
82. *Hyphessobrycon rosaceus.*
83. *Hyphessobrycon minimus.*
84. *Hyphessobrycon eos.*
85. *Hyphessobrycon strictus.*
86. *Dermatocheir catablepta.*
87. *Creagrutus melanzonus.*
88. *Bryconamericus hyphessus.*
89. *Astyanax guianensis.*
90. *Astyanax essequibensis.*
91. *Astyanax mutator.*
92. *Astyanax mucronatus.*
93. *Pœcilurichthys abramoides.*
94. *Pœcilurichthys potaroënsis.*
95. *Deuterodon potaroënsis.*
96. *Deuterodon pinnatus.*
97. *Phenacogaster megalostictus.*
98. *Phenacogaster microstictus.*
99. *Brycon siebenthali.*
100. *Pygocentrus bilineatus.*
101. *Rœboides thurni.*
102. *Charax rupununi.*
103. *Asiphonichthys hemigrammus.*
104. *Cynopotamus essequibensis.*
105. *Acanthocharax microlepis.*
106. *Heterocharax macrolepis.*
107. *Acestrorhynchus nasutus.*
108. *Gymnorhamphichthys hypostomus.*
109. *Sternarchus leptorhynchus.*
110. *Porotergus gymnotus.*

111. *Porotergus gimbeli.*
112. *Rhinosardinia serrata.*
113. *Stolephorus guianensis.*
114. *Rivulus brevicеps.*
115. *Rivulus holmiæ.*
116. *Rivulus waimacui.*
117. *Rivulus stagnatus.*
118. *Rivulus lanccolatus.*
119. *Rivulus frenatus.*
120. *Acanthophacelus melanzonus.*
121. *Acanthophacelus bifurcus.*
122. *Tomeurus gracilis.*
123. *Nannacara bimaculata.*
124. *Æquidens potaroënsis.*
125. *Heterogramma ortmanni.*
126. *Crenicichla alta.*
127. *Dormitator gymnocephalus.*
128. *Soleonasus finis.*

CHAPTER VIII.

SYSTEMATIC ACCOUNT OF THE FRESHWATER FISHES OF BRITISH GUIANA.

Class SELACHII.

Order BATOIDEI.

Suborder *MASTICURA*.

Whip-tailed Rays.

Family I. DASYATIDÆ.

Tail abruptly slender, its back usually with a serrated spine; pectoral fins uninterrupted, confluent around the snout; teeth small; nasal valves forming a flap, which is joined to the upper jaw by a narrow frenum; spiracles large.

Subfamily Potamotrygoninæ.

Pelvis with a sword-shaped cartilage extending forward in the mid-ventral line.

Key to the Guiana Genera of Potamotrygoninæ.

a. Tail with irregular thorns on its upper surface, and with a large spine.
b. Mouth with papillæ; teeth in more than twenty-five rows..... **Potamotrygon.**
bb. Mouth without papillæ; teeth in less than twenty-five rows..... **Paratrygon.**
aa. Tail with many short spines about its base..... **Elipesurus.**[1]

Potamotrygon Garman.

Tæniura Müller and Henle, Bericht. K. Preuss. Akad. Wiss., 1837, 117 (*ornatum*).
Potamotrygon Garman, Proc. Bost. Soc. Nat. Hist., 1877, 210.

Type, *Pastinaca humboldtii* Roulin.

1. Potamotrygon hystrix (Müller and Troschel).

? *Pastinaca humboldtii* Roulin, Ann. Sc. Nat., XVI, 1829, 104, pl. 3 (Meta).—Duméril, Hist. Nat. Poiss., I, 1865, 625 (copied).
Potamotrygon humboldtii Garman, Proc. Bost. Soc. Nat. Hist., 1877, 210.
Trygon hystrix Müller and Henle, Syst. Beschr. Plagiostomen, 1841, 167.—Val-

[1] *Elipesurus* was taken by Schomburgk in the Rio Branco, and may occur in the Essequibo basin also.

enciennes, in d'Orbigny, Voy. Am. Mer., V, ii, 1847, 11, pl. 15 (La Plata to Amazon).—Schomburgk, Fishes Brit. Guiana, II, 1842, 180, pl. 20 (Roowa).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 644 (Rupununi; Takutu; Rewa).—Castelnau, Anim. Am. Sud, Poiss., 1855, 103.—Duméril, Hist. Nat. Poiss., I, 1865, 608 (Rio de Janeiro; Lake Maracaibo; Buenos Aires).—Günther, Catalogue, VIII, 1870, 482 (Santarem; Surinam).

Potamotrygon hystrix Eigenmann and Kennedy, Proc. Acad. Nat. Sci. Phila., 1903, 498 (Asuncion).

Tæniura motoro Müller and Henle, Syst. Beschr. Plagiostomen, 1841, 197 (Cuyabá).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 642 (Mouth of the Zuruma).—Duméril, Hist. Nat. Poiss., I, 1865, 624 (Rio de Janeiro).—Günther, Catalogue, VIII, 1870, 484.

Trygon garrapa Schomburgk, Fishes Brit. Guiana, II, 1842, 182, pl. 21 (Rio Branco).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 642 (Rupununi; Takutu; Rio Branco).

Tæniura orbignyi Castelnau, Anim. Am. Sud, Poiss., 1855, 102, pl. 49, fig. 1.—Duméril, Hist. Nat. Poiss., I, 1865, 624 (Tocantins).—Günther, Catalogue, VIII, 1870, 484.—Steindachner, "Flussfische Südamerika's," i, 1879, 11 (Ciudad Bolivar).

Trygon mülleri Castelnau, Anim. Am. Sud, Poiss., 1855, 102, pl. 48, fig. 2.—Duméril, Hist. Nat. Poiss., I, 1865, 621 (Rio Crixas and Araguay).

Trygon henlei Castelnau, Anim. Am. Sud, Poiss., 1855, 102, pl. 48, fig. 3.—Duméril, Hist. Nat. Poiss., I, 1865, 623 (Tocantins).

One specimen, 147 mm. Konawaruk. (C. M. Cat. No. 1737.)

Three specimens, 158, 181, and 174 mm. across the disk. Rockstone sandbank. (C. M. Cat. No. 1738; I. U. Cat. No. 12101.)

Five papillæ behind the teeth of the lower jaw. Oval, disk but little longer than broad, without projecting snout; eye about 2 in the interocular space; interorbital 2 or less in the distance from the tip of the disk to the line between the anterior margins of the eye; middle of back tuberculate, becoming smooth at the margin of the disk; irregularly placed thorns along the middle of the tail in front of the serrated spine, and a lower ventral fold (tails of all the specimens broken a short distance behind the spine).

Back brown with obscure rounded lighter spots, decreasing in size to fine vermiculations on the fin (*garrapa* of Schomburgk); in the smaller specimens the darker areas about the light spots are intensified into four to seven black spots, two of which are sometimes confluent, forming an hour-glass, or less regular streak

(*histrix* of Schomburgk); sides of tail banded, lower surface of tail marbled; a small black spot near the middle of the belly.

PARATRYGON Duméril.

Paratrygon DUMÉRIL, Hist. Nat. Poiss., I, 1865, 594.

Disceus GARMAN, Proc. Bost. Soc. Nat. Hist., 1877, 208.

Type, *Raja orbicularis* Bloch and Schneider.

This genus is distinguished from *Potamotrygon*, among other characters, by the absence of papillæ in the mouth and by the smaller number of teeth.

2. **Paratrygon orbicularis** (Bloch and Schneider).

"Aiereba" Marcgrave, in PISO, De Indiæ, etc., 1658, 175 (copied by Jonston, De Pisc., pl. 38, fig. 6, and Willughby, 68, pl. 101, fig. 2).

Raja orbicularis BLOCH and SCHNEIDER, Syst. Ichth., 1801, 361.

Trygon orbicularis GÜNTHER, Catalogue, VIII, 1870, 482 (copied).

Trygon strongyloptera SCHOMBURGK, Fishes Brit. Guiana. II, 1842, 183, pl. 22 (Rio Branco).—MÜLLER and TROSCHEL, in Schomburgk, Reisen, III, 1848, 642 (Rupununi; Takutu; Rio Branco).—GÜNTHER, Catalogue, VIII, 1870, 476 (copied).

Trygon aiereba DUMÉRIL, Hist. Nat. Poiss., I, 1865, 592 (Brazil).

No specimens were secured.

Disk ovate, scarcely longer than broad; eyes very small; plain or with undulating stripes.

Class TELEOSTOMI.

KEY TO THE ORDERS OF TELEOSTOMI FOUND IN THE FRESH-WATERS OF GUIANA.

a. Weberian ossicles present; the anterior vertebræ coalesced. A single rayed dorsal fin, usuallyfollowed by an adipose fin.

b. Skin naked or with bony plates; maxillary rudimentary, forming the base of a barbel..**Nematognathi.**

bb. Scales well-developed (rarely naked); maxillary not forming the base of a barbel.

c. Body not eel-shaped (an adipose fin usually present).....**Heterognathi.**

cc. Body elongate, more or less eel-shaped, the anal fin very long.....**Glanencheli.**

aa. No Weberian ossicles; the anterior vertebræ not united.

d. Air-bladder connected with the alimentary canal by an open duct; ventral fins abdominal; no spinous dorsal.

e. A mesocoracoid; body not eel-shaped.....**Isospondyli.**

ee. No mesocoracoid; parapophyses coössified with centra.

f. Body eel-shaped, no paired fins; no separate caudal.

g. Gill-opening single, ventral; premaxillaries normally developed.....**Symbranchii.**

(*gg*. Gill-openings not ventral; premaxillaries rudimentary or wanting. **Apodes.**)[2]

ff. Body not eel-shaped; paired fins; a well-developed caudal fin.....**Microcyprini.**

[2] Müller and Troschel (Schomburgk, *Reisen*, III, 1848, 639) record *Gymnothorax ocellatus* from plantation drains, and the fresh-water eel probably enters the Guiana rivers at times.

dd. Duct of air-bladder closed.

h. Ventral fins sub-abdominal; lower pharyngeals separate.

i. Snout tubiform; mouth terminal, toothless; parietals absent; pterotic extending downward to basioccipital; gills lobate; body armed with dermal plates...**Lophibranchii.**

ii. Snout not tubiform; parietals present; pterotic not reaching basioccipital; body not armed; ventral fins of a spine and five rays.....**Percesoces.**

hh. Ventral fins thoracic.

j. Gill-openings large; a spinous dorsal, or the dorsal very long.

k. Cranium symmetrical.....**Percomorphæ.**

kk. Cranium asymmetrical.....**Heterosomata.**

jj. Gill-opening small; maxillary and premaxillary united; no ribs.....**Plectognathi.**

Order NEMATOGNATHI.

KEY TO THE FAMILIES OF NEMATOGNATHI.

a. Body naked or with a single series of plates along the middle of the sides. Mouth terminal or subterminal.

b. Opercle minute, a mere vestige; neural spines of the coalesced vertebræ forming a ridge from the occipital to the dorsal. Caudal vertebræ greatly compressed, their neural spines expanded. Gill-openings reduced to a slit in front of the pectorals. Air-bladder well-developed. No adipose fin. Teeth villiform. Nares remote. Dorsal short, over the ventrals. Pectoral with a strong spine.....**Aspredinidæ, II.**

bb. Opercle well-developed. Gill-openings usually wide. Caudal vertebræ not compressed, the neural spines spine-like. Maxillary a vestige.

c. Air-bladder well-developed, simple or with transverse constrictions, lying free in the abdominal cavity. Body naked or with a single series of plates along the middle of the sides; an adipose fin.

d. Dorsal over abdominal portion of the vertebral column; anal not very long, its origin far behind the vertical from the dorsal fin.....**Siluridæ, III.**

dd. Dorsal over caudal portion of the vertebral column; anal very long, nearly co-extensive with the tail, its origin far in advance of the vertical from the dorsal; air-bladder transversely elongate, reniform, not covered by bone.....**Helogeneidæ, IV.**

cc. Air-bladder double, a minute one on either side of the coalesced vertebræ.

e. A small adipose fin. Dorsal over the anal, which is very long, origin of anal near the origin of the second third of the length. Air-bladders enclosed by the lateral processes of the coalesced vertebræ, the scapula and the process connecting the scapula with the basioccipital. An adipose fin. Anal of 34 or more rays.

Hypophthalmidæ, V.

ee. No adipose fin; anal short, posterior; dorsal usually in advance of the anal, sometimes far back and over the short anal or behind the origin of the anal in *Tridens*. Air-bladder double, a minute one on each side, enclosed by the lateral processes of the coalesced vertebræ only. Anal short.....**Pygidiidæ, VI.**

aa. Sides with two series of plates; caudal vertebræ normal, the neural and hæmal spines spike-like, separate from each other. Air-bladders minute, one on either side of the coalesced vertebræ and surrounded by a bony capsule, in contact with the skin at a long narrow slit in the temporal plate and at the last of a series of slits below the longer one. Mouth terminal; teeth villiform.

Callichthyidæ, VII.

aaa. Derm more or less completely covered with several series of bony plates; caudal vertebræ compressed, the neural and hæmal spines expanded, forming a continuous ridge above and below. Air-bladder minute, one on either side of the coalesced vertebræ, and surrounded by a bony capsule, in contact with the skin at a notch in the posterior margin of the temporal plate at the beginning of the lateral line. Mouth inferior, the lower lip reverted, the lips disk-like; teeth (if present) in many series, a single series erect.....**Loricariidæ, VIII.**

Family II. ASPREDINIDÆ.

The "Banjamans" (banjoman).

= *Aspredinoidei* Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 117.
= *Aspredinina* Günther, Catalogue, V, 1864, 266.
= *Aspredinidæ* Gill, Arrangement of the Families of Fishes, 1872, 19.
= *Bunocephalidæ* Eigenmann and Eigenmann, Am. Nat., 1888, 647; Occasional Papers Cal. Acad. Sci., I, 1890, 12.
Characters given in the key to the families, p. 119.

Key to the Genera of Aspredinidæ.

a. Tail long, with a median dorsal fold; distance of vent from tip of snout less than half its distance from base of caudal. A. 50–60. (*Aspredininæ*.)
b. A series of barbels from the corner of the mouth along the breast and anterior part of abdomen; maxillary barbel with a smaller barbel at its base.
c. Tip of snouth smooth, ethmoid without hooks; a single pair of mental barbels (rarely wanting). **Chamaigenes.**
cc. Tip of snout (nasals and ethmoid) with four broad spines; a pair of mental and a pair of post-mental barbels.....**Aspredinichthys.**
bb. Breast and head not margined with tentacles. Maxillary barbel adnate.
d. Maxillary barbel with a smaller barblet near its base.....**Aspredo.**
dd. Maxillary without a barblet at its base.....**Platystacus.**
aa. Tail short, vent nearly equidistant from tip of snout and base of caudal. Anal with 11 rays or fewer. (*Bunocephalinæ*.)
e. Dorsal well-developed, of five rays, the last of which is adnate. Barbels six.
f. Head depressed, its greatest depth about half its width; coracoid and coracoid processes not prominent; no prominent tentacles about head; humeral process extending past coracoid process.....**Bunocephalus.**
ff. Head about as deep as wide; coracoid and coracoid processes prominent; head externally tuberculate; coracoid process extending past humeral process.....**Agmus.**

Subfamily Aspredininæ.

Chamaigenes[3] gen. nov.

Chamaigenes Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 380 (name only).

[3] χαμαιγενής, earth-born.

Type, *Aspredo filamentosus* Cuvier and Valenciennes.

Distinguished by the marginal tentacles of the head and breast, and by the absence of prominent hooks on the ethmoid. Nasals each with a hook, which is partially concealed. A single pair of mental barbels.

3. Chamaigenes filamentosus (Cuvier and Valenciennes).

Aspredo filamentosus Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 437, pl. 450 (Cayenne).—Günther, Catalogue, V, 1864, 270 (Demerara).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 26.

Platystacus filamentosus Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), II, 1889, 50; Occasional Papers Cal. Acad. Sci., I, 1890, 24.

Chamaigenes filamentosus Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 380.

Several specimens; largest about 215 mm. Georgetown. (C. M. Cat. No. 1553*a–e*; I. U. Cat. No. 11971.)

Distance from tip of snout to dorsal plate about 4.5 in the length to base of caudal; depth of head about half its width, which is almost equal to its length to upper angle of gill-openings. A. 51–56; D. 5; last ray adnate for half its length, the first ray extremely elongate, considerably longer than its distance from the tip of the snout in the adult.

Eye small, about one-fourth the interorbital; maxillary barbel reaching gill-opening or pectoral, scarcely adnate; patches of teeth of the two premaxillaries forming a single band; width of mouth about one-third the width of the head; a small barbel on the maxillary barbel opposite the corner of the mouth; a series of barbels directly back of it past the base of the pectoral; a pair of post-mental barbels, corresponding in position to the post-mentals in *tibicen*; no mental barbels.

A round pectoral pore under the tip of the humeral process; pectoral spine with hooks on its inner margin, increasing in size toward the tip; those of the outer margin small, directed at right angles to the spine.

Chocolate, without blotches; lower surface plain; a dark streak back from eye. Anterior part of anal hyaline; ventrals dusky, other fins blackish.

Aspredinichthys Bleeker.

Aspredinichthys Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 118 (*tibicen*).

Type, *Aspredo tibicen* Temminck.

Readily distinguished by the four nasal spines and the marginal tentacles of the head and breast.

4. **Aspredinichthys tibicen** (Temminck).

Aspredo tibicen (Temminck) Cuvier and Valenciennes Hist. Nat. Poiss., XV, 1840, 438 (Surinam).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 630 (coast of Guiana).—Günther, Catalogue, V, 1864, 270 (British Guiana).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 26.

Platystacus tibicen Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), II, 1889, 50; Occasional Papers Cal. Acad. Sci., I, 1890, 24 (Caruca; Rio Muria).

Aspredinichthys tibicen Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 118.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 381.

Large series of individuals up to a length of almost 215 mm. from the Georgetown market. Evidently the most abundant of the banjomans. (C. M. Cat. No. 1552*a–o*; I. U. Cat. No. 11970.)

Distance from snout to dorsal plate nearly 5 in the length to the caudal; width of head about equal to its length to the upper angle of the gill-opening; depth of head about half its width; D. 5, the last ray adnate, the first much prolonged, its length in the adult equal to its distance from the eye or longer, not much produced in the young. A. 51–58, the last ray adnate.

Head pointed, width of mouth one-third width of head, snout produced beyond the mouth for about one-third the width of the latter; eye rather large, almost half the width of the interorbital; maxillary barbels about reaching gill-openings, adnate for about one-fourth their length; maxillary barbel with a barbel opposite the corner of the mouth; a series of barbels behind it on the lower surface of the head and breast to about the base of the pectoral. A pair of mental barbels nearly equidistant from each other and from the mouth, not reaching the post-mental barbels, which are nearly twice as far apart; lower surface of head warty; a round pectoral pore below the tip of the humeral process; inner margin of pectorals with spines increasing toward the tip, those of the outer margin pointed toward its tip.

Slaty, irregularly marked with squarish darker blotches on the back; ventrals and anterior part of anal hyaline, other fins slate or blue-black.

I examined two specimens of this species in the Museum at Leiden from Surinam.

Aspredo Bleeker.

Aspredo (*ex* Linnæus, Mus. Adolphi Fred., 1754, 73) Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 117 (*batrachus*).

Type, *Aspredo batrachus* Gronow = *Aspredo aspredo* (Linnæus).

Distinguished by the absence of marginal tentacles on the head and breast and by having a basal barblet on the maxillary. Snout without hooks.

Two species, distinguished thus:

KEY TO THE SPECIES OF ASPREDO.

a. Head to tip of nuchal plate more than 4 in the length to base of caudal..... aspredo.
aa. Head to tip of nuchal plate 4 or less in the length to the caudal..... sicuephorus.

5. Aspredo aspredo (Linnæus).

Silurus aspredo LINNÆUS, Syst. Nat., ed. 10, 1758, 304; ed. 12, 1766, 502.—BONNATERRE, Tabl. Enc. Ichth., 1788, 150.—LACÉPÈDE, Hist. Nat. Poiss., V, 1803, 78.

Platystacus aspredo EIGENMANN and EIGENMANN, Proc. Cal. Acad. Sci., (2), II, 1889, 50 (Pará; Arary); Occasional Papers Cal. Acad. Sci., I, 1890, 23.

Aspredo aspredo EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 380; Proc. U. S. Nat. Mus., XIV, 1891, 26.

Platystacus lævis BLOCH, Ausl. Fische, VIII, 1794, 58.—BLOCH and SCHNEIDER, Syst. Ichth., 1801, 373.

Aspredo lævis MÜLLER and TROSCHEL, in Schomburgk, Reisen, III, 1848, 630 (Waini).

Aspredo batrachus (*ex* Linnæus, Mus. Adolphi Fred., 1754, 73) GRONOW, Cat. Fish, ed. Gray, 1854, 137.—BLEEKER, "Silures de Suriname," 1864, 93 (Surinam).—GÜNTHER, Catalogue, V, 1864, 268, part (British Guiana; Cayenne; Surinam).

No specimens of this species were secured. It has been recorded from Guiana by Müller and Troschel and by Günther.

Head greatly depressed, spatulate; interorbital width 3.5 in the distance from base of pectoral to tip of snout. Mouth broad, the snout projecting almost its entire length; each jaw with two patches of small teeth. Maxillary barbel reaching to base of pectoral, an accessory barbel in front; mental barbel placed near the lip, extending to the post-mental, which is equal to the interorbital. Coracoid processes slightly diverging backward, the length equal to the space between them. A minute pectoral pore at the extremity of the coracoid process. Humeral process a little longer than the coracoid process and overlapping it.

Distance of dorsal fin from tip of snout 3.8 in the length; first dorsal ray rarely prolonged. Outermost caudal rays slightly produced. Pectoral spine as in *A. tibicen*. Dorsal surface uniform purplish brown, the ventral surface plain light, shading into light purple or pinkish; dorsal fin dusky, usually with a dusky median stripe on the interradial membrane; caudal dark, except the outermost rays; pectorals smutty, ventrals usually white, the posterior half sometimes dusky; anal fin white anteriorly, becoming dusky backward; maxillary barbels more or less dusky. Greatest width before pectoral fins 5.66–6 in the length; A. 51–55.

In the specimens recorded by Cuvier and Valenciennes as *lævis* the head is 4 or less than 4 in the length to the tip of the caudal.

6. **Aspredo sicuephorus** Cuvier and Valenciennes. (Plate I, fig. 1.)

Aspredo sicuephorus Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 439 (Mana).—Günther, Catalogue, V, 1864, 269 (copied).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 380.

Platystacus sicuephorus Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), II, 1889, 50; Occasional Papers Cal. Acad. Sci., I, 1890, 24 (Curuca; Rio Muria).

Aspredo lævis Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 431 (Guiana).

Aspredo batrachus Günther, Catalogue, V, 1864, 269, part.

Abundant in the brackish water about Georgetown. The largest of the Aspredinidæ secured.

Many specimens, the largest 340 mm. No young were secured. (C. M. Cat. No. 1551*a–e*; I. U. Cat. No. 11969.)

Distance from snout to predorsal plate 4 to tip or to base of caudal; width of head equal to its length to upper angle of gill-opening, its depth little more than a fourth of its width; D. 5, the last ray adnate. A. 54–57, the last ray adnate.

Eye minute; maxillary barbel adnate for nearly half its length, reaching the pectoral spine, a small barbel near its base reaching the mental barbel, the latter to the post-mental, the three in a nearly straight line, the mental barbel just behind the angle of the mouth; patches of teeth on the two premaxillaries separate in the middle; mouth broad, half the width of the head; the snout projecting beyond the mouth for half the width of the latter; first dorsal ray more or less prolonged; pectoral spine heavy, with nearly straight teeth on its inner margin, teeth on its outer margin smaller, pointed toward the tip of the spine; no axillary pore.

Uniform light brown to slate above, ventral and anterior part of anal hyaline; anal and caudal dark.

I have also examined the specimens in the Leiden and the British Museums. It is very probable that *aspredo* and *sicuephorus* are identical. Günther's specimens "*e*" and three of "*a–d*" are *sicuephorus*, while one has the head more than 4 in the length and represents *aspredo*.

Platystacus Bloch.

Platystacus Bloch, Ausl. Fische, VIII, 1794, 52 (sp.).—Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 118.

Type, *Platystacus cotylephorus* Bloch.

Sternal and abdominal region without tentacles; maxillary barbel simple, without tributary barbels at its base; snout without spines.

7. Platystacus cotylephorus Bloch.

Platystacus cotylephorus Bloch, Ausl. Fische, VIII, 1794, 54, pl. 372.—Bloch and Schneider, Syst. Ichth., 1801, 372.—Bleeker, "Silures de Suriname," 1864, 95 (Surinam).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), II, 1889, 50 (Vigia; Pará; Tajapuru); Occasional Papers Cal. Acad. Sci., I, 1890, 21 (Vigia; Pará; Tajapuru).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 300.

Silurus cotylephorus Lacépède, Hist. Nat. Poiss., V, 1803, 78.

Aspredo cotylephorus Günther, Catalogue, V, 1864, 269 (Surinam).

Silurus hexadactylus Lacépède, Hist. Nat. Poiss., V, 1803, 82.

Aspredo sex-cirrhis Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 441.

Aspredo spectrum Gronow, Cat. Fish, ed. Gray, 1854, 137.

I did not observe this species myself, but several specimens were taken by Mr. Ellis.

A. 53–57; greatest width, before pectoral spine, 5.5–6.5 in the length; length of head to gill-opening 9 in the length, with the caudal fin.

Head greatly depressed, narrowed forward; interorbital width 3.5 in the distance from base of pectoral to tip of snout; width of mouth equals the interorbital plus the orbits, the snout projecting half its length. Premaxillaries with two rhomboidal patches of villiform teeth, lower jaw with wider patches of similar teeth. Maxillary barbels reaching to gill-opening, mental not to post-mental barbels, which are as long as or a little longer than the width of the mouth. Coracoid processes slightly diverging backward, the length of the processes 1.25 in the distance between their bases. Humeral processes co-extensive with but not overlapping the coracoid processes. Pectoral pore below the tip of humeral process.

Distance of dorsal fin from tip of snout 3.5–3.75 in the length; first dorsal ray scarcely prolonged. Outermost caudal rays prolonged. Four rows of papillæ on the sides. Dark brown, blotched with lighter.

Subfamily Bunocephalinæ.

Bunocephalus Kner.

Bunocephalus Kner, SB. Akad. Wiss. Wien, XVII, 1855, 95.—Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 118 (*verrucosus*).

Type, *Platystacus verrucosus* Bloch.

Tail short; dorsal well-developed; barbels 6; head depressed, without prominent knobs.

Key to the Species of Bunocephalus.

a. A. 6; distance from snout to dorsal 2.75–3 in the length with the caudal; width 3.5 in the length..... **gronovii.**

aa. A. 7; distance from snout to dorsal considerably more than 3 in the length with caudal; width more than 3 in the length; general color dark chocolate.....**amaurus.**

aaa. A. 8 or 9, rarely 7; distance from snout to dorsal more than 3 in the length with the caudal; width less than 3 in the length; general appearance sand-like.....**chamaizelus.**

8. **Bunocephalus gronovii** Bleeker. (Plate I, figs. 2–2*a*.)

Aspredo verrucosa Gronow, Cat. Fish, ed. Gray, 1854, 137 (not of Bloch).

Bunocephalus verrucosus Kner., SB. Akad. Wiss. Wien., XVIII, 1855, 96 (Barra do Rio Negro).

Bunocephalus gronovii Bleeker, Ichth. Arch. Ind. Prodr., I, 1858, 329 (based on Gronow, Mus. Ichth., II, 1756, 5, No. 153, pl. 5, fig.3).—Günther, Catalogue, V, 1864, 266 (Demerara).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), II, 1889, 48; Occasional Papers Cal. Acad. Sci., I, 1890, 17.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 380.

The following description by Günther is based on a specimen (figs. 2–2*a*), 102 mm. long collected by Hancock. The distance between the end of the snout and the origin of the dorsal fin is one-third, or nearly one-third, of the total length (with the caudal fin); the length of the head to the gill-opening is rather more than one-seventh. Upper jaw but little prominent. The maxillary barbel extends to the third fifth of the pectoral; the dorsal is inserted nearer to the end of the snout than to the root of the caudal. Hind portion of the tail as high as broad. Brown ish, clouded and spotted with darker.

Head to gill-opening 5 in the length; greatest width 3.5; distance of dorsal from tip of snout 2.25; caudal 4; D. 5; A. 6.

9. **Bunocephalus amaurus** sp. nov. (Plate I, fig. 2.)

Bunocephalus amaurus Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 380 (name only).

Type, 69 mm. Konawaruk. (Carnegie Museum Catalog of Fishes No. 1555.)

Cotype, 53 mm. Konawaruk. (I. U. Cat. No. 11973.)

Head to gill-opening 5.66 in the length; greatest width 3.5; distance of dorsal from tip of snout 2.33 in the length; caudal nearly 5. D. 5; A. 7; depth of head 1.5 in distance from pectoral to tip of snout; length of coracoid process about equal to the distance between their bases; anterior margin of coracoid with an externally perceptible crest. Head verrucose but without knobs; nuchal crest prominent, a notch between it and the knobbed dorsal plate.

Maxillary barbels reaching pectoral; pectorals not quite to ventrals; humeral

process reaching last fourth of the pectoral spine; half of the last dorsal ray adnate; caudal peduncle terete; everywhere tuberculate, nine conspicuous series of tubercles on the tail.

Dark chocolate, a light saddle between the dorsal and nuchal crest; back behind the dorsal with lighter blotches; dorsal, caudal, and anal fins black, their margins white, first rays of dorsal and anal and outer rays of caudal banded; ventrals mottled, margined with white, darkest just below the light edge; pectorals black, last rays with light mottlings; barbels banded.

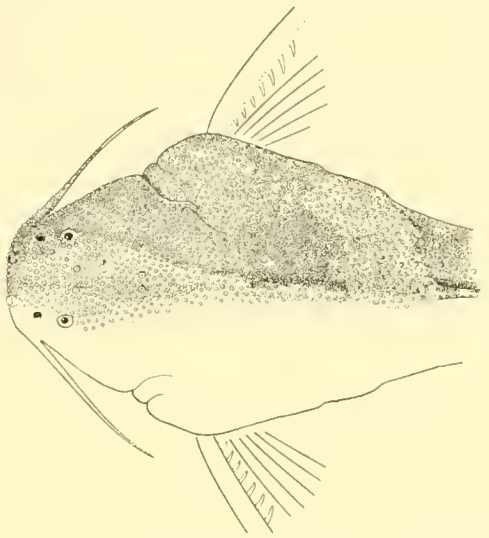

Fig. 24. *Bunocephalus amaurus* Eigenmann. *Type*. C. M. Cat. No. 1555.

10. **Bunocephalus chamaizelus** sp. nov.
(Plate II, fig. 1.)

Bunocephalus chamaizelus Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 380 (name only).

Type, 36 mm. Erukin. (Carnegie Museum Catalog of Fishes No. 1556.)

Cotypes, five specimens, 24–44 mm. Erukin. (C. M. Cat. No. 1557*a* and *b*; I. U. Cat. No. 11974.)

Cotypes, seven specimens, 34–39 mm. Tumatumari. (C. M. Cat. No. 1558*a* and *b*; I. U. Cat. No. 11975.)

Cotypes, six specimens, 30–37 mm. Gluck Island. (C. M. Cat. No. 1559*a* and *b*; I. U. Cat. No. 11976.)

Head to gill-opening 5 in the length; greatest width 3.16; distance of dorsal from snout 2.36 in the length; caudal 4.4–6; D. 5; A. 8 or 9, rarely 7; depth of head about 1.5 in distance of pectoral from tip of snout; length of coracoid process about one-half the distance between its bases; anterior margin of coracoid without an externally visible crest; caudal peduncle terete; everywhere tuberculate, the regular rows of the tail somewhat obscured by the intervening tubercles; tubercles on the head variously developed.

A faint ridge from eye to occiput; occipital with a slight knob, nuchal plate with two, dorsal plate with one, the four in a straight line.

Maxillary barbel reaching pectorals; pectorals to ventrals in the smaller specimens; humeral process reaching third fifth of pectoral spine.

Lighter or darker sand-color; a dark streak from pectoral forward to mouth

or chin, sometimes expanded downward behind gill-opening; a more or less evident dark streak across the nuchal plate; a conspicuous dark band across the back and dorsal fin, extending forward below to the axil; one or two more or less evident dark blotches on the back of the tail, the anterior over the anal; fins colored like the adjoining portions of the body.

AGMUS[4] gen. nov.

Agmus EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 379.

Type, *Agmus scabriceps* Eigenmann and Eigenmann (Plate IV).

This genus differs from *Bunocephalus* in the great development of tubercles about the head, which at the occiput is almost as high as it is wide; the depth of the head at this point equals the distance of the pectoral from the snout. This genus reaches the limit of divergence from *Aspredo*.

11. **Agmus lyriformis** sp. nov. (Plate III.)

Agmus lyriformis EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 379 (name only).

Type, 56 mm. Gluck Island. (Carnegie Museum Catalog of Fishes No. 1554.)

Cotype, 49 mm. Rupununi. (I. U. Cat. No. 11972.)

FIG. 25. *Agmus lyriformis* Eigenmann. *Type*. C. M. Cat. No. 1554.

The only other species of the genus is *A. scabriceps* Eigenmann and Eigenmann from Jutahy, differing from *lyriformis* in its converging coracoid processes, mottled fins, and extremely tubercular head.

Head to end of occipital process 2.66 in its length; depth of head at occipital process about equal to its width at gill-openings. D. 5; A. 6.

Nuchal plate with two high knobs; dorsal plate with two small knobs, one on either side in front of the dorsal; a transverse ridge in front of the nuchal crest, curved backward on the sides and ending in a small knob; a knob over each eye, continued backward as a low crest with a small knob near its middle and a larger one in front of the large occipital knob, the two

[4] ἀγμὸς, a craggy place.

orbital knobs connected by a low ridge, forming a lyre-shaped figure with the crests extending backward from the orbital knobs, which approach each other behind; low crests extending forward from the orbital knob and meeting on the snout, each with a small knob forward of the eye; humeral process extending to the middle of the pectoral spine, a small knob on the sides above and behind its tip; coracoid process extending to the last fifth of the pectoral spine, but slightly converging behind; a transverse ridge joining the bases of the processes, the coracoid outlined by another ridge.

Maxillary barbels extending slightly beyond base of pectoral; mental barbels not reaching post-mentals, post-mentals not equal to interorbital.

Body and head everywhere covered with warts, those on the tail in longitudinal series, those along the lateral line longest.

Dark chocolate, mottled, some of the warts light; first rays of dorsal, anal, ventrals, and pectoral banded, the rest of these fins black, margined with white. Outer rays of the rounded caudal banded, the rest of the fin black, except the extreme tips of the rays, which are white; barbels banded with black and white.

Ventrals in the cotype mottled.

Family III. SILURIDÆ.

"Skin-fishes."

Characters as given in the key, page 119.

Key to the Genera of Siluridæ.

a. Gill-membranes free from the isthmus. Or the nares approximate in *Arius*.

b. Nares approximate, the posterior with a valve (*Ariinæ*).

c. Mental barbels two; maxillary barbel broad, band-like. Pectoral spine, and usually the dorsal spine, with long band-like filaments.....**Felichthys.**

cc. Mental barbels four. Palatine teeth fixed. Head and occipital process covered with very thin skin, granular.

d. Posterior nostrils connected by a membrane.....**Selenaspis.**

dd. Posterior nostrils not connected by a membrane.

e. Palatine patches of teeth with a backward projecting angle on the inner margin.

f. Dorsal plate enlarged, the occipital process correspondingly reduced. **Sciadeichthys.**

ff. Dorsal plate small, crescent-shaped. Occipital process linear or leaf-shaped. **Notarius.**

ee. Palatine patches of teeth without a backward projecting angle. Eye above the level of the mouth; gill-rakers twenty-five or fewer.

h. Teeth on palate granular; no teeth on vomer; gill-membranes united, a narrow membrane free.....**Arius.**

hh. Teeth on palate villiform, vomer with or without teeth.....**Hexanematichthys.**

bb. Nares remote; barbels six; adipose fin well-developed.

i. Teeth incisor-like, in two series in the upper, in a single series in the lower jaw. First dorsal and pectoral rays not spine-like; adipose long (*Callophysinæ*)..... **Callophysis.**

ii. Teeth villiform, in bands (*Pimelodinæ.*)

j. Vomer without teeth or with teeth in minute patches.

k. Snout broad and produced, spatulate. Adipose short. First ray of the dorsal and pectoral fins articulate, not pungent, prolonged in filaments; barbels flat, not fringed..... **Megalonema.**

kk. Adipose fin very long, barbels flat, ribbon-like; dorsal and pectoral spines not pungent, the dorsal spine produced..... **Pinirampus.**

kkk. Snout not produced, barbels not flat.

l. Orbit without a free margin.

m. Dorsal and pectoral spines strong, pungent; body short.

n. Dorsal surface of skull covered with thin skin; head about as broad as long; origin of ventrals behind middle of body, except sometimes in the young; sometimes a small circular fontanel at base of occipital process; frontal fontanel not extending backward behind the eye.

o. Premaxillary patch of teeth with a backward projecting angle. **Pseudopimelodus.**

oo. Occipital crest very short, not nearly reaching dorsal; premaxillary teeth without a backward projecting angle on the sides. Species with a light band across the occiput... **Microglanis.**

nn. Dorsal surface of skull covered with a thick layer of muscle; occipital crest short; origin of ventrals in front of middle... **Brachyglanis.**

mm. Pectoral spines strong but short; dorsal spines small or replaced by a soft ray; skull covered with a thick layer of muscle; anal 17–21, body long, slender; occipital crest short.[5]

p. Caudal rounded; an occipital, no frontal fontanel; ventrals under posterior half of dorsal..... **Leptoglanis.**

pp. Caudal forked; ventrals under posterior half of dorsal; a median ridge from the frontal fontanel to the occipital process; caudal without accessory rays, lower caudal lobe longer; adipose reaching caudal..... **Myoglanis.**[6]

mmm. No dorsal or pectoral spines; upper surface of head covered with the skin only; fontanel a narrow slit continued to base of occipital process; ventrals entirely under the dorsal or partly in front of it, much nearer snout than to caudal, body long and slender.

q. Caudal rounded..... **Heptapterus.**[7]

[5] Skull covered with thin skin; A. 9. *Imparfinis.*

[6] It is probable that *Heptapterus colletti* Steindachner "with the ventrals under the origin of the dorsal; upper caudal lobe longer; caudal with fulera; adipose not reaching caudal" should be the type of another genus.

[7] The genus *Heptapterus* Bleeker, so far as known with certainty, is confined to southeastern tropical America. It consists of the following species: *Heptapterus mustelinus* Valenciennes, from Rio Grande do Sul and the lower La Plata, and *Heptapterus eigenmanni* Steindachner, from Maldonado.

qq. Caudal forked.

r. Anal of eighteen or more rays. . . . . **Acentronichthys.**[8]

rr. Anal of about eleven rays. Premaxillary band of teeth with a backward projecting angle. . . . . **Chasmocranus.**

ll. Orbit with a free margin. Head distinctly longer than broad.

s. Occipital process not reaching the dorsal plate.

t. Fontanel not continued behind the eye; a small pit or fontanel sometimes at the base of the occipital process. . . . . **Rhamdia.**

tt. Fontanel continued to base of occipital process. A dorsal and a pectoral spine. . . . . **Rhamdella.**[9]

ss. Occipital process reaching the dorsal plate; adipose fin longer than high.

u. Occipital process narrow; fontanel to base of occipital process; humeral process spine-like. . . . . **Pimelodella.**

uu. Occipital process tapering; fontanel not continued behind the eyes; humeral process broad, not spine-like.

v. Caudal deeply forked. . . . . **Pimelodus.**

vv. Caudal obliquely rounded. . . . . **Gœldiella.**

jj. Teeth on vomer in moderate or large patches.

w. Barbels not band-like.

x. Head as broad as long. D. I,7. Upper surface of head with vermiculating ridges. Vomerine patch of teeth large, pentagonal, contiguous to the palatine patches. Occipital process large, semicircular, not meeting the reniform dorsal plate, upper half of the adipose fin usually rayed. **Phractocephalus.**

xx. Head longer than broad; inner surface of gill-covers usually with one or more dermal pouches. D. I,6–8. Caudal forked or rounded.

y. Inner teeth of the upper jaw slender and freely movable, the band scarcely narrowed in the middle; teeth on vomer and palatines much smaller, (the palatine teeth smaller than those on the vomer), villiform. Adipose fin equal to or longer than the anal fin; caudal deeply forked, the lobes pointed. . . . . **Brachyplatystoma.**

yy. Teeth all similar in the upper jaw and on the vomer.

z. Head narrowed forward, its width at the mouth scarcely if any more than two-thirds its greatest width; adipose fin longer than the anal; lower jaw produced beyond upper. . . . **Hemisorubim.**

[8] The genus *Acentronichthys* Eigenmann and Eigenmann contains with certainty but one species, the type, *Acentronichthys leptos* Eigenmann and Eigenmann. *Heptapterus surinamensis* Bleeker may belong to this genus. It is certain that the *Heptapterus collettii* placed here by Eigenmann and Eigenmann is not an *Acentronichthys*, for it has a strong pectoral spine.

An examination of the type of *Heptapterus surinamensis* in Leiden gives the following:

Skull covered with thin skin, fontanel a narrow slit to base of occipital process; first dorsal ray just like the second, not spinous; last ventral ray and third dorsal ray about equidistant from the tip of the snout; A. 18; caudal with numerous accessory rays, especially on the ventral side; middle rays radiating, all broken, probably rounded; teeth on each pre-maxillary in a band one-half wider than deep.

It is therefore a *Heptapterus* if the caudal was rounded or an *Acentronichthys* if it was forked.

[9] No dorsal spine; first pectoral ray spinous at its base only; upper caudal lobe longer. *Rhamdia glanis* of southeastern Brazil.

zz. Head depressed, its width at the mouth about equal to its greatest width. Adipose fin shorter than the anal; caudal forked, the rays much branched. Maxillary band of teeth much narrowed in the middle; teeth on the vomer separated on the median line, closely joined to the palatine patches, together forming, on either side, a figure somewhat like a comma. Top of head osseous; the occipital process produced, meeting or nearly meeting the dorsal plate; fontanel extending from the middle of the snout to behind the eyes, and continued to the occipital as a groove.....**Pseudoplatystoma.**

aa. Gill-membranes united and joined to the isthmus; nares remote, without barbels.

A. A series of bony plates along the sides. (*Doradinæ.*)

B. Eye small, in anterior portion of head; snout depressed; teeth well-developed; humeral process much longer and stronger than the coracoid process; anterior nares near the upper lip. .....**Doras.**

BB. Eye in middle or behind the middle of the head.

C. Barbels all simple, teeth none.....**Oxydoras.**

CC. Maxillary and mental barbels fringed.

D. Teeth none; a single large pectoral pore.....**Leptodoras.**

DD. Teeth in one or both jaws; numerous pectoral pores.....**Hemidoras.**

AA. No plates along the sides.

E. Maxillary and mental barbels present. (*Auchenipterinæ.*)

F. Mental barbels in two pairs. Adipose fin shorter than the anal fin.

G. Anal short, 7–11; mouth terminal; jaws equal; caudal forked; V. 6...**Centromochlus.**

GG. Anal 19–41.

H. Caudal obliquely truncate or slightly emarginate; outer margin of pectoral spine serrate; mouth terminal, jaws equal or the lower longer; no prominent bony orbit. V. 6–10, A. 19–40.....**Trachycorystes.**

HH. Caudal deeply forked; outer margin of pectoral spine smooth or granular. V. 8; A. 17–21.....**Pseudauchenipterus.**

FF. Mental barbels arranged in a series near the symphysis; adipose fin short; dorsal fin well-developed, I,6. Teeth villiform. V. 12–15.....**Auchenipterus.**

EE. Maxillary barbels only. (*Ageneiosinæ.*)

I. Air-bladder projecting into the abdominal cavity, naked laterally, the skin over it forming a large pseudo-tympanum; snout short, about equal to the eye.
Tympanopleura.

II. Air-bladder minute, concealed under peritoneum and largely covered with bone; no pseudo-tympanum. Snout much longer than eye.....**Ageneiosus.**

Subfamily Ariinæ.

Felichthys Swainson.[10]

[10] A specimen of *Feliehthys* 295 mm. long marked *filamentosus* is in the Leiden Museum, from Ind. Occid., probably collected by Schomburgk.

Dorsal from snout 3 in the length; highest anal ray 6+ in the length, base of anal 7; pectoral spine 4 in the length, dorsal spine 4.8; anal lobe with numerous black dots; A. 19; distance of adipose from dorsal 2.6 in the length. This specimen would therefore be *bahiensis.*

Gaff-topsail Catfishes.

Breviceps Swainson, Class. Fishes, Amph., and Rept., I, 1838, 328 (*bagre*).

Felichthys Swainson, Class. Fishes Amph., and Rept., II, 1839, 305, substitute for *Breviceps* Swainson, preoccupied (*bagre*).

Ailurichthys Baird and Girard, Proc. Acad. Nat. Sci. Phila., 1854, 26 (*marinus*).

Ælurichthys Gill, Proc. Acad. Nat. Sci. Phila., 1863, 172, emendation.

Mystus Gronow, Cat. Fish, ed. Gray, 1854, 165 (*carolinensis*), name preoccupied.

Pimelodus Bleeker, "Silures de Suriname," 1864, 65 (*bagre*), not of Lacépède, as restricted by Gill.

Nostrils close together, separated by a valve; lower jaw with only two barbels, band-like; dorsal and pectoral spines prolonged into filaments.

Key to the Species of Felichthys.

a. Distance of dorsal fin from tip of snout 3.33 in the length; distance of adipose from the dorsal fin 2.6 times in the length, or longer; base of anal 4.66 in the length, or longer. Anterior lobe of anal with minute dots; highest anal ray less than half the length of the base of the anal; vomerine and palatine patches of teeth separate; anal rays 32–35.....**bagre.**

aa. Distance of dorsal from tip of snout 3 in the length; distance of adipose from dorsal fin 3 in the length; highest anal ray about as high as the base of the anal, which is 5.8–6.5 in the length; anal rays 20–24.....**marinus.**

12. **Felichthys bagre** (Linnæus).

Silurus bagre Linnæus, Syst. Nat., ed. 12, I, 1766, 505.—Gmelin, Syst. Nat., I, iii, 1788, 1360.

Pimelodus bagre Lacépède, Hist. Nat. Poiss., V, 1803, 93, 98 (Brazil).—Bleeker, "Silures de Suriname," 1864, 66 (Surinam).

Ælurichthys bagre Jordan, Proc. U. S. Nat. Mus., IX, 1886, 559 (name only).

Ailurichthys bagre Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 148 (São Matheos; Santos; Pará; Curuca; Bahia; Pernambuco; Brit. Guiana); Occasional Papers Cal. Acad. Sci., I, 1890, 33.

Felichthys bagre Gill, Proc. U. S. Nat. Mus., XIII, 1891, 354.—Jordan and Evermann, Bull. U. S. Nat. Mus. No. 47, I, 1896, 116.

Galeichthys gronovii Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 40 (Guiana; Maracaibo; Mana; Cayenne; Bahia).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 628 (Waini and Barima).—Kner, SB. Akad. Wiss. Wien, XXVI, 1857, 392 (Cajutuba; Pará).

Ælurichthys gronovii Günther, Catalogue, V, 1864, 178 (Demerara; West Indies).

Galeichthys eidouxii Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 43 (Guayaquil).

Ælurichthys eydouxii Jordan, Proc. U. S. Nat. Mus., VII, 1884, 40 (note on type).

Bagrus macronemus Ranzani, Nov. Com. Acad. Sci. Inst. Bonon., V, 1842, 334, pl. 28 (Brazil).

Mystus carolinensis Gronow, Cat. Fish, ed. Gray, 1854, 156.

Pimelodus longifilis "Mus. L. B." (*fide* Bleeker).

Eight specimens, 194–354 mm. Georgetown market. (C. M. Cat. No. 1270, 1271; I. U. Cat. No. 11773.)

With the characters given in the key.

13. **Felichthys marinus** (Mitchill).

Silurus marinus Mitchill, Trans. Lit. and Philos. Soc. N. Y., I, 1814, 433.

Galeichthys marinus DeKay, Nat. Hist. New York, Zoology, IV, 1842, 178, pl. 37, fig. 118 (New York).

Ailurichthys marinus Baird and Girard, Proc. Acad. Nat. Sci. Phila., 1854, 26.—Girard, U. S. and Mex. Boundary Survey, II, 1859, 31, pl. 14 (Indianola, Tex.).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 148 (Rio de Janeiro; Pará; Bay of Balaxy; Mobile Bay; Pernambuco; Victoria); Occasional Papers Cal. Acad. Sci., I, 1890, 36.

Ælurichthys marinus Günther, Catalogue, V, 1864, 178 (North America).—Goode, Proc. U. S. Nat. Mus., II, 1879, 119 (St. Johns River, Florida).—Steindachner, "Flussfische Südamerika's," i, 1879, 10 (Orinoco near Ciudad Bolivar).—Jordan and Gilbert, Proc. U. S. Nat. Mus., V, 1882, 246 (abundant from Pensacola, Florida, to Galveston, Texas), 584 (Charleston, S. C.).—Jordan, Proc. U. S. Nat. Mus., VI, 1883, 106 (Key West, Florida).—Jordan and Gilbert, Synopsis Fishes N. Am., 1883, 111 (Cape Cod to Mexico).—Jordan, Cat. Fishes N. Am., 1885, 16 (name only); Proc. U. S. Nat. Mus., IX, 1886, 26 (Beaufort, N. C.).

Felichthys marinus Gill, Proc. U. S. Nat. Mus., XIII, 1891, 354.—Jordan and Evermann, Bull. U. S. Nat. Mus. No. 47, I, 1896, 118.

Galeichthys parræ Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 33 (New York; Charlestown; New Orleans; Rio Janeiro).—Castelnau, Anim. Am. Sud, Poiss., 1855, 37 (Bahia).—Hyrtl, Denkschr. Akad. Wiss. Wien, XVI, 1859, 17 (vertebræ 13 + 7 + 30).

Several specimens, Georgetown market. (C. M. Cat. No. 1484.)

With the distinguishing characters given in the key.

Sciadeichthys Bleeker.

Sciades Müller and Troschel, Horæ Ichth., III, 1849, 8 (*emphysetus et pictus*).

Sciadeichthys Bleeker, Ichth. Arch. Ind. Prodr., I, 1858, 62, 66 (*emphysetus*), not *Sciadeichthys* Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 99.

Type, *Bagrus emphysetus* Müller and Troschel.

This genus is distinguished from other South American Silurids by the approximate nares, the enlarged dorsal plate, the backward projecting angle of the palatine patches of teeth, and the absence of an internarial membrane. The species are indiscriminately called "gillbacker."

Only four species were secured, but several others found at Cayenne may occur occasionally or seasonally in Guiana.

Key to the Species of Sciadeichthys.

a. Teeth on the palate villiform or bluntly conical.
  b. Dorsal plate pointed in front, entering the notched occipital process.
    c. Eye 8 in interorbital; dorsal plate as wide as the cranium behind the eye; granulations not extending forward to eyes..... **flavescens.**
    cc. Eye 4 in interorbital; dorsal plate much narrower than the cranium behind the eye, its surface striate; maxillary barbel reaching past origin of ventrals..... **emphysetus.**
  bb. Dorsal plate notched in front, receiving the point of the occipital process. Eye nearer snout than to preopercle; jaws subequal; occipital process broader than long, mucronate at tip. Eye 1.25 in snout..... **pröops.**
aa. Teeth on the palate granular..... **parkeri.**

14. **Sciadeichthys flavescens** (Cuvier and Valenciennes). (Plate V, fig. 1.)

Bagrus flavescens Cuvier and Valenciennes, Hist. Nat. Poiss., XIV, 1839, 462 (Cayenne).—Kner, SB. Akad. Wiss. Wien, XXVI, 1857, 386 (locality ?).

Arius flavescens Günther, Catalogue, V, 1864, 151 (copied).

Galeichthys flavescens Jordan, Proc. U. S. Nat. Mus., IX, 1886, 559 (name only).

Tachisurus flavescens Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 141 (name only); Occasional Papers Cal. Acad. Sci., I, 1890, 53.

Sciadeichthys flavescens Jordan and Evermann, Bull. U. S. Nat. Mus. No. 47, I, 1896, 123.

The head of a specimen of this species was secured in the Georgetown market. It measures 305 mm. to the dorsal. (C. M. Cat. No. 1265.)

15. **Sciadeichthys emphysetus** (Müller and Troschel). (Plate IX, fig. 1.)

Bagrus (*Sciades*) *emphysetus* Müller and Troschel, Horæ Ichth., III, 1849, 8 (Surinam).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 627 (Waini and Barima).

Arius emphysetus Günther, Catalogue, V, 1864, 150 (copied).

Sciades emphysetus Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 91 (name only).

Galeichthys emphysetus Jordan, Proc. U. S. Nat. Mus., IX, 1886, 559.

Tachisurus emphysetus, Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 144; Occasional Papers Cal. Acad. Sci., I, 1891, 53.

Arius physacanthus Vaillant, Bull. Mus., d'Hist. Nat., V, 1899, 155; Nouv. Arch. Mus. d'Hist. Nat., (4), II, 1900, 128, pl. 7, fig. 1–1*c* (French Guiana).

I have examined the type of *emphysetus* in the Berlin Museum and five specimens, 250–500 mm., Georgetown market. (C. M. Cat. No. 1487, 1735, 2486; I. U. Cat. No. 12110.) I have not been able to find any specimens in the Berlin Museum from Guiana. The type from Surinam is undoubtedly identical with the specimens described below and with Vaillant's *physacanthus*.

Head 3.8; depth 5.75; D. I, 7; A. 17 or 18; adipose fin 9.5 in the length; eye 3 in the snout, 4 in the interorbital, 10 in the head.

Head depressed forward, the snout broad; width of the head at the rictus equal to the greatest depth; dorsal plate shield-shaped, its pointed anterior end fitting into the notched occipital process, its width 1.3 in the width of the skull behind the eyes; occipital process about half as wide as broad; surface of dorsal plate pitted; occipital process with rows of nodules, the median row being most prominent; skull striate to in front of eye; maxillary barbels reaching past base of ventrals; outer mental barbel to middle of pectoral. Teeth all small, those of the roof of the mouth in four contiguous patches, the palatine patches large, subcircular.

Basal half or more of the dorsal spine swollen, its length equal to the width of the head at the eyes or the opercle; anterior half of the swollen part of the dorsal spine tuberculate, the part beyond with recurved notches both in front and behind; pectoral spine about equal to the dorsal spine, the outer margin tuberculate to near the tip, where it is notched, the posterior surface serrate; caudal deeply forked, the upper lobe longer, 4 in the length; anal emarginate.

Bluish gray above, white below; tips of dorsal, pectorals, ventrals and anterior part of anal dusky.

16. Sciadeichthys proöps (Cuvier and Valenciennes). (Plate V, fig. 2; Plate VI, figs. 1–3.)

Bagrus proöps Cuvier and Valenciennes, Hist. Nat. Poiss., XIV, 1839, 457 (Antilles; Guiana; Surinam; Porto Rico).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 627 (Waini and Barima).—Kner, SB. Akad. Wiss. Wien, XXVI, 1857, 386 (locality ?).

Arius proöps Günther, Catalogue, V, 1864, 148 (copied).

Netuma proöps Bleeker, Ichth. Arch. Ind. Prodr., I, 1858, 67; "Silures de Suriname," 1864, 62, pl. 7, pl. 12, fig. 2 (Surinam).

Galeichthys proöps JORDAN, Proc. U. S. Nat. Mus., IX, 1886, 559 (name only).

Tachisurus proöps EIGENMANN and EIGENMANN, Proc. Cal. Acad. Sci., (2), I, 1888, 141 (Pernambuco); Occasional Papers Cal. Acad. Sci., I, 1890, 57.

Sciadeichthys proöps JORDAN and EVERMANN, Bull. U. S. Nat. Mus. No. 47, I, 1896, 123.

Several specimens, 245–680 mm. Georgetown market. (C. M. Cat. No. 1263, 1264, 1280; I. U. Cat. No. 11774.)

I have also examined the specimens in the Leiden and Berlin Museums mentioned in the synonymy.

Head 4–4.33; depth 7; D. I,7; A. 18. Eye 1.25–1.5 in snout, 5.5–8 in head, 1.75–2.66 in the interorbital.

Slender and elongate, broader than deep. Head depressed, its width 1.33 in its length, its depth 2, width at mouth 2; anterior portion of the head flat above; top of the head, humeral process, and dorsal plate coarsely granular, the granules arranged in series along the fontanel. Occipital process mucronate, broader than long; dorsal plate large, butterfly-shaped. Operele striate; fontanel 1.5 times as long as the eye, its center in front of the middle of the eye, continued as a shallow groove.

Jaws subequal; teeth all villiform, the intermaxillary band very wide and shallow; teeth on the roof of the mouth in six contiguous patches.

Gill-membranes meeting in an angle, forming a broad fold across the isthmus. Gill-rakers 5 + 10. Pectoral pore large; vertical series of pores present.

Distance of dorsal spine from snout 2.8 in the length; the dorsal spine granular in front, striate on the sides, weakly serrate behind, its length 1.25–1.5 in the head. Space between dorsal and adipose fins 2.75–3 in the length, the adipose fin little shorter than the dorsal, the posterior margin free. Caudal deeply forked, its upper lobe longer, 4–4.5 in the length. Anal emarginate, as high as long, 2–2.33 in the head. Ventrals 2 in the head. Pectoral spine rough or granular in front, serrate behind, 1.2–1.33 in the head.

Plumbeous above, with blue lustre, white below; maxillary barbels dark, the mental barbels white; fins all more or less dotted with brown.

Abundant at Georgetown. The skull is prepared and sold in souvenir stores as the "Crucifix Fish."

17. Sciadeichthys parkeri (Traill). (Plate V, fig. 3.)

Silurus parkeri TRAILL, Mem. Wern. Soc., VI, 1832, 377, pl. 6, fig. 1 (muddy water of rivers of Guiana).—SCHOMBURGK, Fishes Brit. Guiana, I, 1843, 188 (Guiana).

Arius parkeri Günther, Catalogue, V, 1864, 153 (copied).

Galeichthys parkeri Jordan, Proc. U. S. Nat. Mus., IX, 1886, 559 (name only).

Tachisurus parkeri Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 141 (name only); Occasional Papers Cal. Acad. Sci., I, 1890, 65.

Selenaspis parkeri Jordan and Evermann, Bull. U. S. Nat. Mus. No. 47, I, 1896, 123.

Arius quadriscutis Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 111 (Cayenne; Mana).—Kner, SB. Akad. Wiss. Wien, XXVI, 1857, 389 (Pará).

Netuma quadriscutis Bleeker, "Silures de Suriname," 1864, 59, pl. 8, pl. 13, fig. 2 (Surinam).

Several specimens, 238–408 mm. Georgetown market. (C. M. Cat. No. 1272–1279; I. U. Cat. No. 11775.)

I have also examined the specimen of *quadriscutis* mentioned by Bleeker.

Head 3.6; depth 5.33–5.5; D. I,7; A. 15–18.

Body comparatively stout, the greatest width equaling the greatest depth. Head large, flattish above; profile descending; width of head 1.17 in its length; width at the mouth 2–2.4, its depth at the base of the occipital process scarcely less than its greatest width. Top of head coarsely granular in young, the granules becoming finer and more regularly arranged in the adult; opercles smooth; humeral process with radiating lines of granules. Dorsal plate large, emarginate in front, receiving the pointed occipital process. Middle of the fontanel above the posterior margin of the eye. No skinny flap connecting the posterior nostrils.

Maxillary barbels extending little beyond the base of the pectoral or shorter; mental barbels short. Teeth in jaws coarse, conical, those on the palate and vomer finely granular, the patches separate in the young, but united and covering most of roof of mouth in the adult. Gill-membranes forming a broad marginal flap across the isthmus. Gill-rakers 3–4 + 7–9.

Distance of dorsal from tip of snout 2.33 in the length; the spine 1.33–1.6 in the head, granular in front, serrate behind. Distance of adipose fin from the dorsal 4–4.5 in the length, the adipose fin twice as long as high, adnate, as long as the dorsal fin.

Caudal forked, the upper lobe longer, 4.33–4.5 in the length. Anal fin about as long as high, 2.15–2.25 in the head. Ventrals 1.75–2 in the head.

Pectoral spine stout, 1.25–1.16 in the head, granular in front (serrate in young), striate on sides, serrate along inner margin.

Yellow in life. The most abundant catfish of the Georgetown market.

Selenaspis Bleeker.

Selenaspis Bleeker, Ichth. Arch. Ind. Prodr., I, 1858, 62 (*herzbergii*).

Leptarius Gill, Proc. Acad. Nat. Sci. Phila., 1863, 170 (*dowii*).

Type, *Silurus herzbergii* Bloch.

This genus is distinguished from *Sciadeichthys* by the internarial membrane. The character is scarcely of generic importance, especially since in the young of *S. proöps* a slit or incipient membrane is often present between the posterior nares.

Two species are found on the Atlantic coast of America, and a third one on the Pacific coast of Panama.

Key to the Species of Selenaspis.

a. Upper jaw distinctly longer than lower; snout 3.5 in the head; palatine teeth forming a U-shaped figure. ..... herzbergii.

aa. Upper jaw distinctly shorter than the lower; snout about 7 in the head; palatine teeth forming a transverse patch without backward projecting angles. ..... passany.

18. Selenaspis herzbergi (Bloch). (Plate VII, fig. 1.)

Silurus herzbergii Bloch, Ausl. Fische, VIII, 1794, 33, pl. 367 (Surinam).—Bloch and Schneider, Syst. Ichth., 1801, 383 (Surinam).

Bagrus herzbergii Cuvier and Valenciennes, Hist. Nat. Poiss., XIV, 1839, 453 (Mana; Cayenne).—Kner, SB. Akad. Wiss. Wien, XXVI, 1857, 386 (Pará).

Selenaspis herzbergii Bleeker, Ichth. Arch. Ind. Prodr., I, 1858, 63.—Jordan and Evermann, Bull. U. S. Nat. Mus. No. 47, I, 1896, 125.—Eigenmann and Bean, Proc. U. S. Nat. Mus., XXXI, 1907, 659 (Amazon).

Arius herzbergii Günther, Catalogue, V, 1864, 144 (British Guiana; Demerara).—Vaillant, Nouv. Arch. Mus. d'Hist. Nat., (4), II, 1900, 124 (Mahury, French Guiana).

Netuma herzbergii Bleeker, "Silures de Suriname", 1864, 61, pl. 9, pl. 13, fig. 3, (Surinam).

Galeichthys herzbergii Jordan, Proc. U. S. Nat. Mus., IX, 1886, 559 (name only).

Tachisurus herzbergii Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 141 (Pará; Curuca; Bahia); Occasional Papers Cal. Acad. Sci., I, 1890, 59.

Pimelodus argenteus Lacépède, Hist. Nat. Poiss., V, 1801, 94, 102.

Bagrus pemecus Cuvier and Valenciennes, Hist. Nat. Poiss., XIV, 1839, 456 (Cayenne).

Bagrus mesops Cuvier and Valenciennes, Hist. Nat. Poiss., XIV, 1839, 456.—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 627 (Waini and

Barima).—Kner, SB. Akad. Wiss. Wien, XXVI, 1857, 384, pl. 1, fig. 2 (Pará).

Arius mesops Günther, Catalogue, V, 1864, 145 (copied).

Galeichthys mesops Jordan, Proc. U. S. Nat. Mus., IX, 1886, 559 (name only).

Tachisurus mesops Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 141 (name only); Occasional Papers Cal. Acad. Sci., I, 1890, 57.

Sciadeichthys mesops Jordan and Evermann, Bull. U. S. Nat. Mus. No. 47, I, 1896, 123.

Bagrus cœlestinus Müller and Troschel, Horæ Ichth., III, 1849, 7 (Guiana).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 627 (Waini and Barima).

Hexanematichthys hymenorhinus Bleeker, Versl. en Med. Akad. Wet. Amsterdam, XIV, 1862, 377 (Surinam); "Silures de Suriname," 1864, 57, pl. 11, fig. 2, pl. 13, fig. 4 (Surinam).

Netuma dubia Bleeker, Versl. en Med. Akad. Wet. Amsterdam, XIV, 1862, 382 (Surinam); "Silures de Suriname," 1864, 63, pl. 15, fig. 2, pl. 13, fig. 5 (Surinam).

Arius dubius Günther, Catalogue, V, 1864, 144 (copied).

Galeichthys dubius Jordan, Proc. U. S. Nat. Mus., IX, 1886, 559 (name only).

Tachisurus dubius Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 141 (name only).

Many specimens, 230–335 mm. Georgetown market. (C. M. Cat. No. 1266–1269; I. U. Cat. No. 11776.)

Several specimens, to 197 mm. Mahaica. (C. M. Cat. No. 1733).

Head 3.66–3.75; depth 5–6; D. I,7; A. 18. Eye 1.75–2.5 in snout, 2.33–4 in interorbital, 5.5–8 in head.

Elongate, the width equal to or greater than the depth. Width of the head 1.25–1.33 in its length, at the angle of the mouth about 2; its depth 1.66–1.75 in its length. Humeral process, dorsal plate, and top of head to between the eyes, granular. Occipital process wider than long, scarcely keeled. Fontanel not continued behind the eyes and without backward projecting groove. Posterior nares connected by a membrane.

Barbels flattish, those of the maxillary reaching to near the ventrals (to middle of pectorals in older individuals); post-mental to or beyond base of pectoral, mental to gill-opening. Teeth villiform, vomerine and palatine patches of about equal size and shape in the young, a separate patch behind the palatines being developed sooner or later. The teeth of the palate differ more than in any other species.

Gill-membranes meeting in an angle, forming a fold across the isthmus. Gill-rakers 6 + 10.

Distance of dorsal spine from snout 2.5–2.75 in the length; dorsal and pectoral spines subterete, the outer margin roughened, the sides striate; the dorsal spine slightly serrate behind, a little shorter than the pectoral spine, 1.4–1.6 in the head; pectoral spine strongly serrate behind. Space between the dorsal and adipose fins 3.6–4 in the length. Adipose fin as long as the dorsal. Upper caudal lobe the longer, about 4 in the length. Anal as high as long, 2 in head. Ventral 1.6–2 in head. Pectoral pore minute; sides with vertical series of pores. Plumbeous above, silvery on sides, fins dusky.

I have examined the types of *cœlestinus*, *hymenorhinus*, *dubius*, and *mesops*. They are all identical with *herzbergi*.

In the types of *Bagrus cœlestinus* Müller and Troschel in the Berlin Museum, 215–275 mm. long, from Guiana, there is a distinct but narrow streak between the posterior nostrils. The teeth are just as in a specimen of *herzbergi* 270 mm., collected by me.

The *mesops* of Müller and Troschel, about 320 mm., is like *cœlestinus*, but the posterior patches of teeth are not so highly developed as in the latter.

Fig. 26. Teeth of *Selenaspis herzbergi* (Bloch). Total length of specimens the teeth of which are figured in order from left to right: 140 mm.; 240 mm.; 300 mm.

Three specimens of *herzbergi*, *hymenorhinus*, and *dubius*, 255, 207, and 170 mm. long, in the Leiden Museum, have the dorsal aspect of the head alike, and the maxillary barbels extend respectively not quite to the end of the pectoral, to the ventral, and a little beyond the origin of the ventral. The internasal membrane is most developed in the largest and least in the smallest specimen. In the second in size the posterior palatine patches are not developed, corresponding with a specimen 210 mm. long collected by me and now in the Berlin Museum. In the smallest the two palatine patches are close together and the posterior patches much larger in proportion.

19. **Selenaspis passany** (Cuvier and Valenciennes). (Plate VII, fig. 2.)

Bagrus passany Cuvier and Valenciennes, Hist. Nat. Poiss., XIV, 1839, 458 (Cayenne).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 627 (Waini and Barima).

Arius passany Günther, Catalogue, V, 1864, 149 (copied).

Galeichthys passany Jordan, Proc. U. S. Nat. Mus., IX, 1886, 559 (name only).

Tachisurus passany Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 141; Occasional Papers Cal. Acad. Sci., I, 1890, 58.

I have examined the specimen about 543 mm. long collected by R. Schomburgk and now in the Berlin Museum, No. 2968.

It is very similar to *herzbergii* but can easily be distinguished by its short snout or rather abbreviated upper jaw and the peculiar dentation of the palate.

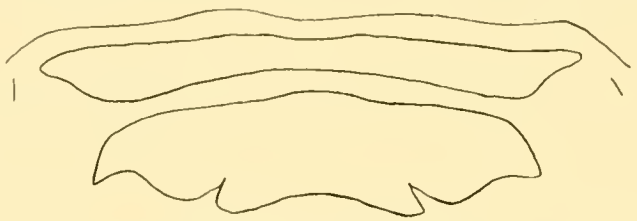

Fig. 27. Teeth of *Selenaspis passany* (Cuvier and Valenciennes).

Notarius Gill.

Arius Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 91 (*grandicassis*), not *Arius* Bleeker, 1858.

Notarius Gill, Proc. Acad. Nat. Sci. Phila., 1863, 171 (*grandicassis*).

Type, *Arius grandicassis* Cuvier and Valenciennes.

Distinguished by its peculiar and variable occipital crest. Dorsal plate small; occipital crest not wider, usually much narrower at its base than towards its middle or tip.

But three species of this genus are known. They range along the coast of South America from near Bahia to Guiana. All three are abundant in the Georgetown market.

Key to the Species of Notarius.

a. Occipital process narrowly and deeply constricted at base, its margins regularly and strongly convex. **grandicassis.**

aa. Occipital process broadly and deeply constricted, its margins describing a double curve; convex toward tip, concave toward base. . . . . **parmocassis.**

aaa. Occipital process narrowed, its margins scarcely convex. . . . . **stricticassis.**

20. Notarius grandicassis (Cuvier and Valenciennes). (Plate VIII, fig. 1.)

Arius grandicassis Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 54, pl. 427 (Guiana?).—Günther, Catalogue, V, 1864, 153 (copied).

Galeichthys grandicassis Jordan, Proc. U. S. Nat. Mus., IX, 1886, 559 (name only).

Tachisurus grandicassis EIGENMANN and EIGENMANN, Proc. Cal. Acad. Sci., (2), I, 1888, 141 (Maranhao; Bahia); Occasional Papers Cal. Acad. Sci., I, 1890, 65.
Netuma grandicassis JORDAN and EVERMANN, Bull. U. S. Nat. Mus. No. 47, I, 1896, 126.

Several specimens, 335–490 mm. Georgetown market. (C. M. Cat. No. 1254–1259; I. U. Cat. No. 11777.)

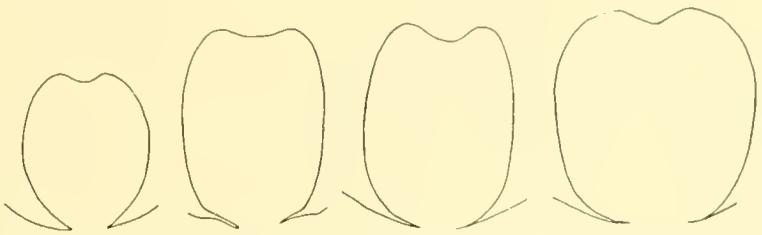

FIG. 28. Outlines of occipital processes of various individuals of *Notarius grandicassis* (Cuvier and Valenciennes). Total length of specimens the processes of which are figured in order from left to right: 335 mm.; 435 mm.; 400 mm.; 490 mm.

Head 3.4–3.75; depth 5.66–6; D. I,7; A. 18. Eye 3–3.5 in snout, 4–4.5 in interorbital, 8.5–10 in head.

Body cylindrical in front, tapering to a slender caudal pendunele. Head greatly depressed, profile almost straight, descending, the width of the head 1.33–1.4 in its length, its depth 1.8–2 in its length. Occipital process with a deep constriction where it joins the occiput, shaped like a clover leaflet, much longer than broad, sometimes keeled. Center of the fontanel over the middle of eye, the fontanel not continued backward as a groove. Occipital process, top of head, and humeral process granular; interorbital region with four ridges, the inner ones bounding the fontanel, the outer ones running obliquely backward from near the posterior nares.

Maxillary barbels reaching to the base of the pectorals, mentals to gill-opening, post-mentals a little longer.

Upper jaw projecting a diameter of the eye or more, the lip very wide, especially in front, making the nose pointed; teeth of both jaws rather large, those on the palate somewhat smaller; the depth of the premaxillary band 7–9 in its width; the mandibulary band very shallow; vomerine teeth present in adult; palatine patches triangular, produced backward; four patches in adult, the two additional ones placed just back of the two triangular ones in front.

Gill-membranes meeting in an angle, forming a fold across the isthmus. Gill-rakers 6 + 10.

Distance of dorsal spine from snout 2.33–2.5 in the length. Distance of adipose fin from the dorsal 3.6–4 in the length; adipose fin at least as long as the

dorsal fin, adnate. Caudal fin forked, the upper lobe longer, about 5 in the length. Anal fin longer than high. Ventrals small. Pectoral pore large.

Light brown above, somewhat smutty below.

21. **Notarius parmocassis** (Cuvier and Valenciennes). (Plate VIII, fig. 2.)

Arius parmocassis Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 57 (Bahia).—Günther, Catalogue, V, 1864, 154 (copied).

Tachisurus grandicassis parmocassis Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 141 (Bahia; San Matheos; Maranhao); Occasional Papers Cal. Acad. Sci., I, 1890, 68.

Netuma stricticassis Jordan and Evermann, Bull. U. S. Nat. Mus. No. 47, I, 1896, 126, part.

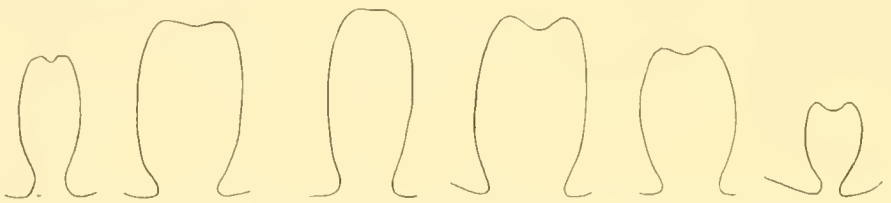

Fig. 29. Outlines of occipital processes of various individuals of *Notarius parmocassis* (Cuvier and Valenciennes). Total length of specimens the processes of which are figured in order from left to right: 376 mm.; 418 mm.; 480 mm.; 435 mm.; 375 mm.; 232 mm.

Several specimens, 232–480 mm. Georgetown market. (C. M. Cat. No. 1250–1253; I. U. Cat. No. 11779.)

This species differs from *grandicassis* in having the occipital process separated from the occiput by a broader constriction and the process more elongate-ovate.

Vomerine teeth are present in the adult. No patches of teeth are found back of the two triangular palatine patches.

22. **Notarius stricticassis** (Cuvier and Valenciennes). (Plate VIII, fig. 3.)

Arius stricticassis Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 58 (Cayenne).—Günther, Catalogue, V, 1864, 154 (copied).—Bleeker, "Silures de Suriname," 1864, 55, pl. 5, pl. 12, fig. 4 (Surinam).

Tachisurus grandicassis stricticassis Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 141 (Bahia; Maranhao); Occasional Papers Cal. Acad. Sci., I, 1890, 68.

Netuma stricticassis Jordan and Evermann, Bull. U. S. Nat. Mus. No. 47, I, 1896, 126.

Several specimens, 280–405 mm. Georgetown market. (C. M. Cat. No. 1260–1262; I. U. Cat. No. 11778.)

I have also examined the specimens in the Leiden Museum.

This species differs from *Notarius parmocassis* in having the occipital process still narrower, the margins being little convex. No teeth on vomer; no patches behind the two triangular palatine patches.

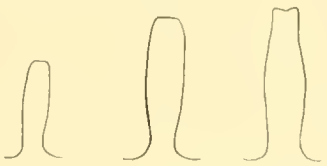

FIG. 30. Outlines of occipital processes of three specimens of *Notarius stricticassis* (Cuvier and Valenciennes). Total length of specimens the processes of which are figured in order from left to right: 280 mm.; 400 mm.; 405 mm.

ARIUS Cuvier and Valenciennes.

Arius CUVIER and VALENCIENNES, Hist. Nat. Poiss., XV, 1840, 53.—BLEEKER, Ichth. Arch. Ind. Prodr., I, 1858, 62, 67 (*arius*).

Type, *Pimelodus arius* Buchanan.

Palatine patches of teeth without a backward projecting angle; teeth of the palate granular, none on the vomer; gill-membranes united to the isthmus, with a very narrow free margin across the latter.

23. Arius spixi (Agassiz).[11] (Plate IX, fig. 2.)

Pimelodus a bidus SPIX, Selecta Gen. et Spec. Pisc. Bras., 1829, pl. 7, fig. 1 (Equatorial Brazil).

Pimelodus spixii AGASSIZ, Selecta Gen. et Spec. Pisc. Bras., 1829, 19.

Arius spixii CUVIER and VALENCIENNES, Hist. Nat. Poiss., XV, 1840, 76 (copied).

Tachisurus spixii EIGENMANN and EIGENMANN, Proc. Cal. Acad. Sci., (2), I, 1888, 146 (Maranhao; Bahia; Rio Janeiro; Pará; Santos in São Paulo; Abrolhos); Occasional Papers Cal. Acad. Sci., I, 1890, 88.—JORDAN and EVERMANN, Bull. U. S. Nat. Mus. No. 47, I, 1896, 131.

Arius arenatus CUVIER and VALENCIENNES, Hist. Nat. Poiss., XV, 1840, 106 (Cayenne).—GÜNTHER, Catalogue, V, 1864, 172 (copied).—BLEEKER, "Silures de Suriname," 1864, 53, pl. 4, fig. 2 (Surinam).

Galeichthys arenatus JORDAN, Proc. U. S. Nat. Mus., IX, 1886, 558 (name only).

Arius nuchalis GÜNTHER, Catalogue, V, 1864, 171 (British Guiana).

Galeichthys nuchalis JORDAN, Proc. U. S. Nat. Mus., IX, 1886, 559 (name only).

[11] Two specimens of *fissus* from Cayenne (from the Paris Museum) and one from Surinam (all in the museum at Leiden) have head 3.4 and 3.6 in the length; otherwise they are very similar to the specimens of *arenatus* (=*spixi*) with head 3.9 in the length. The palatine patches of teeth are also smaller.

Tachisurus nuchalis Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 145 (name only); Occasional Papers Cal. Acad. Sci., I, 1890, 86.—Jordan and Evermann, Bull. U. S. Nat. Mus. No. 47, I, 1896, 131.

There is no doubt that the specimens recorded below are identical with the *nuchalis* of Günther, the types of which I have examined. Whether or not they are identical with *spixi* is not quite so certain.

Several specimens, 128–235 mm. Georgetown market. (C. M. Cat. No. 1287*a–c*; I. U. Cat. No. 11781.)

Several specimens, 140 mm. Mahaica. (C. M. Cat. No. 1732.)

Head 3.6–4; depth 5–5.5; D. I,7; A. 21. Eye 1.5–2 in the snout, 5–6.5 in the head, 2.75–3 in the interocular.

Body compressed, especially towards the caudal fin, the depth greater than the width. Head narrowed forward, its greatest width 1.33 in its length, its greatest depth 1.5; width at the mouth 2.2 in the length of the head. Top of the head granular in the young, the granules becoming more or less united in the adult, forming fine reticulating ridges, especially on the occipital process; occipital process longer than broad, with a blunt median ridge, the margins concave. Fontanel narrowing without interruptions, continued as a deep tapering groove to near the base of the occipital process; interorbital area with four ridges; opercles and humeral process rough, covered with skin; sides of the head and snout with reticulating mucous canals.

Maxillary barbels varying in extent, from about the middle of the pectoral to the base of the ventrals; post-mental barbels extending to base of pectoral or to near its tip; mentals to edge of gill-membrane or to beyond base of pectoral.

Upper jaw projecting; lips more or less papillose; teeth on the premaxillary and the outer ones of the mandible villiform; the inner series of the mandible and the palate granular; the palatine patches of teeth small, subovate, sometimes contiguous in front.

Gill-membranes united, joined to the isthmus, a very narrow free margin across it. Gill-rakers 6 + 11–13. Pectoral pore moderate.

Distance of dorsal spine from snout 2.33–2.64 in the length; the spines 1.2–1.5 in the head, serrated on its inner margin, granular or almost smooth on its outer margin. Distance of adipose from the dorsal fin 3.2–3.6 in the length, the adipose fin shorter than the dorsal fin, free posteriorly. Caudal forked, the upper lobe slightly the longer, 4–5 in the length. Anal fin scarcely longer than high, its highest ray about 2 in the head. Ventral fin 1.66–2 in the head. Pectoral spine strong, about as long as the dorsal spine, serrate on its inner margin, granular or scarcely roughened on the outer margin.

Color brownish above; sides and ventral surface silvery, sometimes with brown dots.

HEXANEMATICHTHYS Bleeker.

Hexanematichthys BLEEKER, Ichth. Arch. Ind. Prodr., I, 1858, 62, 65.

Type, *Bagrus sondaicus* Cuvier and Valenciennes.

Similar to *Arius*, but the palatine teeth villiform. The species are found largely on the Pacific Coast. But one species has been taken in British Guiana.

24. **Hexanematichthys rugispinis** (Cuvier and Valenciennes). (Plate IX, fig. 3.)

Arius rugispinis CUVIER and VALENCIENNES, Hist. Nat. Poiss., XV, 1840, 77 (Cayenne).—KNER, SB. Akad. Wiss. Wien, XXVI, 1857, 388 (Pará).—GÜNTHER, Catalogue, V, 1864, 156 (copied).—VAILLANT, Nouv. Arch. Mus. d'Hist. Nat., (4), II, 1900, 124 (Carsevenne, French Guiana).

Galeichthys rugispinis JORDAN, Proc. U. S. Nat. Mus., IX, 1886, 559 (name only).

Tachisurus rugispinis EIGENMANN and EIGENMANN, Proc. Cal. Acad. Sci., (2), I, 1888, 145 (Pará); Occasional Papers Cal. Acad. Sci., I, 1890, 83.

Several specimens, 235–420 mm. Georgetown market. (C. M. Cat. No. 1281–1286; I. U. Cat. No. 11780.)

Head 3.5–4; depth 5.5–6; D. I, 7; A. 19–21. Eye 3 in snout; 3.5 in interorbital, 10 in head. Slender, tail compressed. Head broad and depressed, tapering forward; width of the head 1.5–1.4 in its length, at the angle of the mouth 2.4–2.5; depth of head 1.6–2; profile rather steep. Top of head, humeral process, front and sides of the spines, and dorsal plate granular, the granulation not extending forward to above middle of cheeks. Occipital process triangular, about as long as broad, the median ridge not very prominent. Middle of the fontanel behind the eye, the posterior portion separated by a bridge, not continued backward as a groove; interorbital region with four ridges.

Barbels villiform; maxillary barbel reaching to or beyond base of pectoral, post-mental to gill-opening, mental barbels much shorter.

Mouth inferior, lower jaw included, lips thick; teeth villiform, the anterior ones in the jaws longer, depth of the premaxillary band 4 in its width; palatine patches of teeth one diameter of the eye apart, the width of the patches less than one diameter of the eye.

Gill-membranes meeting in an angle, forming a fold across the isthmus. Gill-rakers 6 + 11. Pectoral pore none; vertical series of pores present.

Distance of dorsal spine from the snout 2.33–2.5 in the length. Space between dorsal and adipose fins 4–4.66 in the length. Adipose fin adnate, as long as the anal fin. Ventrals 2.5 in the head; pectoral spine serrate behind.

Subfamily Callophysinæ.

Callophysus Müller and Troschel.

Callophysus Müller and Troschel, Horæ Ichth., III, 1849, 1 (sp.).—Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 101 (*macropterus*).

Pimelotropis Gill, Proc. Acad. Nat. Sci. Phila., 1859, 196 (*lateralis* = *macropterus*).

Pseudocallophysus Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 102 (*ctenodus* = *macropterus*).

Type, *Pimelodus macropterus* Lichtenstein.

One series of teeth in the lower jaw, two series in the upper; dorsal and pectoral without spines; adipose long. A single species.

25. Callophysus macropterus (Lichtenstein).

Pimelodus macropterus Lichtenstein, Wiedem. Zool. Mag., I, iii, 1819, 59 (Brazil).

Callophysus macropterus Müller and Troschel, in Schomburgk, Reisen, III, 1848, 629 (Essequibo); Horæ Ichth., III, 1849, 1 (Brazil; Guiana).—Günther, Catalogue, V, 1864, 137 (copied).—Peters, MB. Akad. Wiss. Berlin, 1877, 470 (Apuré).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 120 (Obidos; Lake José Assu; Cameta; Rio Negro; Santarem; Tonantins; Manacapuru); Occasional Papers Cal. Acad. Sci., I, 1890, 95.—Eigenmann and Bean, Proc. U. S. Nat. Mus., XXXI, 1907, 659 (Amazon).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 382.

Pimelodus ctenodus Agassiz, Gen. et Spec. Pisc. Bras., 1829, 21, plate 8*a* (Equatorial Brazil).—Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 186 (copied).—Castelnau, Anim. Am. Sud, Poiss., 1855, 35 (Amazon).

Callophysus ctenodus Müller and Troschel, Horæ Ichth., III, 1849, 2 (Brazil).—? Kner, SB. Akad. Wiss. Wien, XXVI, 1857, 422 (locality?).—Günther, Catalogue, V, 1864, 137 (copied).

Pimelodus insignis Schomburgk, Fishes Brit. Guiana, I, 1841, pl. 6 (not descr.).

Pimelotropis lateralis Gill, Proc. Acad. Nat. Sci. Phila., 1859, 196 (Amazon).

Callophysus lateralis Günther, Catalogue, V, 1864, 136 (copied).—Steindachner, "Ichthyologische Beiträge," v, 1876, 105 (Santarem; Tabatinga; Montalegre; Obidos; Rio Negro; Tonantins; Lake Manacapuru; José Assu).—Cope, Proc. Am. Philos. Soc., XVII, 1878, 676 (Peruvian Amazon).—Vaillant, Bull. Soc. Philom., (7), IV, 1880,—(Calderon).

No specimens were secured. I have examined the specimen collected by Schomburgk and now in Berlin.

Head 4–4.66; depth 5–6; Br. 8–9; D. 7; A. 12; eye 3–4 in the snout, 2–3 in the interorbital, 7–8 in the head.

Barbels flat, those of the maxillary reaching to the end of the adipose or beyond. Color uniform light brown, or with spots on the sides and adipose.

Subfamily Pimelodinæ.

Pinirampus Bleeker.

Pinirampus Bleeker, Ichth. Arch. Ind. Prodr., I, 1858, 198 (*pirinampu*).
Pirinampus Günther, Catalogue, V, 1864, 135.

Type, *Pimelodus pirinampu* Spix.

Barbels broad, flat with a membranous border behind; first dorsal and pectoral rays articulate, not pungent; adipose fin much longer than the anal fin; no teeth on the vomer. A single species.

26. **Pinirampus pirinampu** (Spix).

"Mairipak."

Pimelodus pirinampu Spix, Gen. et Spec. Pisc. Bras., 1829, 20, pl. 8 (Brazil).—Schomburgk, Fishes Brit. Guiana, I, 1841, 183 (Guiana).—Castelnau, Anim. Am. Sud, Poiss., 1855, 35 (Amazon).

Pinirampus pirinampu Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 121 (Cameta); Occasional Papers Cal. Acad. Sci., I, 1890, 104.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 383.

Pimelodus pirinampus Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 196 (Brazil).—? Kner, SB. Akad. Wiss. Wien, XXVI, 1857, 416 (locality ?).

? *Pimelodus barbancho* Humboldt, Rec. Obs. Zool., II, 1833, 172 (Venezuela).

Pinirampus typus Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 100 (name only).

Pirinampus typus Günther, Catalogue, V, 1864, 135 (copied).

A single specimen of this species 770 mm. long from the falls of the Mazaruni was secured for me by Mr. Fowler, Commissioner of Lands and Mines. (C. M. Cat. No. 2490.)

Head 4.66, depth about 6; D. I,6; A. 11; eye 5.5 in the snout (3.5 in young), 10.75 in the head (7.5 in young), 5 in the interorbital (2.5 in young); adipose 2.2 in the length.

Head depressed, snout parabolic, body subterete, slightly compressed above; caudal peduncle subterete. First dorsal ray prolonged, longer than the head. Pectoral spine equal to the head in length, not prolonged; adipose dorsal beginning near middle of last dorsal ray; maxillary barbel extending to end of ventrals.

Steel blue above, white below.

MEGALONEMA gen. nov.

Megalonema EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 383 (name only).

Type, *Megalonema platycephalum* sp. nov.

Pimelodines without teeth on vomer, the pectoral and dorsal spines prolonged into filaments, articulate, not pungent; barbels flattened, not fringed; premaxillary band of teeth without backward projecting angles; occipital process narrow, not reaching dorsal plate; caudal deeply forked; eye in middle of head.

27. **Megalonema platycephalum** sp. nov. (Plate X, fig. 2.)

Megalonema platycephalum EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 383 (name only).

Type, 173 mm. Tumatumari. (Carnegie Museum Catalog of Fishes No. 1684*a*.)

Cotypes, four specimens, 37–65 mm. Tumatumari. (C. M. Cat. No. 1685*a*; I. U. Cat. No. 12060.)

Head 3.66; depth 5.5, D. I,6; A. 11; eye 2 in snout, 5 in head, equal to interorbital.

Triangular in section at the dorsal, becoming oval at the caudal peduncle; profile nearly straight descending to the snout, ventral profile straight.

FIG. 31. Outline of premaxillary band of teeth in *Megalonema platycephalum* Eigenmann.

Head rounded at the occiput, flat between the eyes; occipital process spine-like, not quite reaching the dorsal plate; a pair of ridges from in front of the maxillary barbels converging to the base of the occipital process; fontanel not continued to the posterior margin of the eye; upper jaw projecting the width of the premaxillary band of teeth; snout broad, depressed, width of mouth equals half the length of the head; width of premaxillary band of teeth 7 in the length of its outer margin, its outer ends rounded.

Maxillary barbel reaching tip of anal; outer mental barbel reaching tip of inner pectoral ray; the mental barbels some distance in advance of the outer or post-mentals, reaching base of pectorals; gill-membranes broadly overlapping, separate to below the angle of the mouth.

Dorsal spine slender, articulate above, as long as the head, the rays decreasing

in height, the second extending past the tip of the last; space between the dorsals 6.5 in the length, base of adipose 4.25; caudal lobes slender, longer than head, the middle rays about one-third the length of the lobes; anal emarginate, the anterior rays extending past the tip of the last; ventrals not reaching anal; pectoral to ventrals.

Straw-color in alcohol; a pair of hidden spots at the base of the caudal, lower lobe dusky.

In the specimen 65 mm. long the first pectoral ray is enormously prolonged, reaching past origin of the anal; first dorsal ray to the adipose; in the younger specimens they are shorter. In the young there is a faint lateral streak, an area along the base of the anal and along the middle of the back, four streaks on the snout, one from mouth up to base of maxillary barbel and then back to eye, and a pair along the middle of the snout, diverging in front and behind.

Pseudopimelodus Bleeker.

Pseudopimelodus Bleeker, Ichth. Arch. Ind. Prodr., I, 1858, 196, 207 (sp.); Nederl. Tijdschr. Dierk., I, 1863, 101 (*raninus*).

Batrachoglanis Gill, Ann. Lyc. Nat. Hist. N. Y., VI., 1858, 389.

Type, *Pimelodus raninus* Cuvier and Valenciennes.

Distinguished from *Microglanis* by the backward projecting angles in the premaxillary patches of teeth.

In 1890 I identified *Pimelodus bufonius* with the *Pimelodus zungaro* of Humboldt. Humboldt's species is known only from his figure and description, which are said to have been taken from a fish three feet four inches long and reported to attain seven feet. It is very doubtful whether the *zungaro* of Eigenmann and Eigenmann from Goyaz is identical with Humboldt's species. It is also very doubtful whether *Pimelodus mangurus* Valenciennes from the La Plata is synonymous with *zungaro*. This elimination of synonyms leaves the genus *Pseudopimelodus*, as here understood, consisting of *raninus* Cuvier and Valenciennes (the type), *bufonius* Cuvier and Valenciennes, *acanthocheira* Eigenmann and Eigenmann, *cottoides* Boulenger, and the two species here described.

Key to the Species of Pseudopimelodus.

a. Occipital crest not meeting the dorsal plate; dorsal, caudal and ventrals in adult spotted, the latter two not margined with white; dorsal with a median or submedian light bar on the last rays, its margin sometimes white; no humeral spine, pectoral teeth not as wide as the spine . . . **villosus.**

aa. Occipital crest meeting the dorsal plate; a humeral spine.

b. Teeth on anterior margin of the pectoral spine as wide as the spine or wider.

c. Nape usually without a distinct light band; dorsal, caudal, anal and ventrals edged with white.

d. Maxillary barbels not quite reaching gill-opening; dorsal spine rough on both edges. **albomarginatus.**

dd. Maxillary barbels reaching a little beyond tip of humeral process.....**raninus.**

(*cc*. Nape with a zigzag cross-band; anal margined with white.....**acanthochira.**

bb. Teeth on anterior margin of the pectoral less than half the width of the spine.....**cottoides** and **bufonius.**)

28. **Pseudopimelodus villosus** sp. nov. (Plate X, fig. 1.)

?*Pimelodus raninus* (not of Cuvier and Valenciennes) Müller and Troschel, in Schomburgk, Reisen, III, 1848, 628 (all rivers).

Pimelodus (*Pseudopimelodus*) *raninus* Peters, MB. Akad. Wiss. Berlin, 1877, 470 (Apuré).

Pseudopimelodus villosus Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 384 (name only).

Type, 148 mm. Potaro Landing. (Carnegie Museum Catalog of Fishes No. 1677.)

Cotypes, two specimens, 148 and 142 mm. Potaro Landing. (I. U. Cat. No. 12056.)

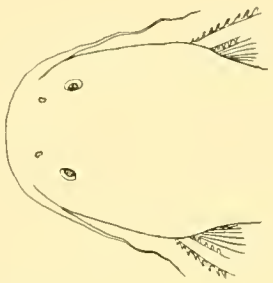

Fig. 32. Outline of *Pseudopimelodus villosus* Eigenmann. *Type*. C. M. Cat. No. 1677.

Cotype, one specimen, 38 mm. Kumaka, Demerara. (C. M. Cat. No. 1680.)

Cotype, one specimen, 52 mm. Wismar. (C. M. Cat. No. 1679.)

Head 3–3.2; depth 5–5.3; D. I,6; A. 11; eye 3 in snout, 10 in head, 5 in distance between the eyes.

Everywhere covered with fine hair-like filaments, these especially abundant above the pectoral. Width of head scarcely less than its length; depth of head a little more than half its length; head flat above; anterior nostrils with very short tubes; jaws equal; width of mouth equaling length of head without snout; depth of premaxillary bands of teeth 6 in their width; a sharp backward prolongation at the outer angle; maxillary barbel reaching middle of pectoral, outer mental barbel

to the base of the last ray; inner mental barbels considerably in advance of the outer.

Distance of dorsal spine from snout 2.4 in the length, the spine about half the length of the head, roughened with antrorse notches in front towards the tip, smooth behind; dorsal rays nearly all of the same height, equal to head less snout; caudal notched, the upper lobe longer, nearly equal to the length of the head; and rounded, reaching caudal; ventrals to anal; pectorals not to ventrals; pectoral spine strong, about equal to head without snout, with retrorse teeth along its entire posterior margin, its anterior margin with antrorse teeth which, in the adult, are nearly as long as the spine is wide.

Marbled, dark and light brown, without distinct markings on the body, the area between the dorsals and below the posterior part of the adipose lighter in the younger specimens. Margin and a variable median band on the posterior rays of the dorsal light; caudal, anal, ventrals and pectorals profusely spotted, the margins hyaline.

In the specimens mentioned by Müller and Troschel and by Peters the premaxillary band of teeth have a backward projecting angle. Both are in such a bad state of preservation that I am not sure whether they are to be referred to this species or not.

29. **Pseudopimelodus albomarginatus** sp. nov. (Plate XI, fig. 1.)

Pseudopimelodus albomarginatus EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 384 (name only).

Type, 98 mm. Tukeit. (Carnegie Museum Catalog of Fishes No. 1680.)

Cotypes, twenty-one specimens, 33–108 mm. Tukeit. (C. M. Cat. No. 1681 *a–d*; I. U. Cat. No. 12057.)

Cotype, one specimen, 90 mm. Waratuk. (C. M. Cat. No. 1682.)

Head 2.66–2.9; depth 4.66; D. I,6; A. 10; eye 4 in snout; 12 in head, 5 in space between the eyes.

Snout much depressed, head flat above; width of head but very little less than its length, its height equal to half its width; anterior nostrils with a tube projecting slightly beyond the upper lip; jaws equal, width of mouth equals length of head without the snout; width of premaxillary bands of teeth about 6 in their anterior margin, a long pointed backward projecting angle; maxillary barbel not quite reaching gill-opening; outer mental barbel scarcely shorter.

Distance between snout and dorsal spine 2.25–2.3 in the length, the spine slightly rough on the upper half of its margins; dorsal rays of nearly equal height,

2 in the head; caudal notched, the upper lobe much longer, nearly or quite equal to the length of the head; anal reaching lobe of caudal, ventrals to anal; pectorals not to ventrals; pectoral spine less than half the length of the head, its inner margin with strong recurved hooks, its outer margin with still larger teeth, antrorse near the tip, retrorse near the base.

Black, with markings of brown, the lighter color forming a blotch on the sides, below the space between the dorsal and a few smaller irregular ones in front of it; adipose and upper surface of caudal peduncle and a spot on or near the lower surface of the peduncle also light brown. Dorsal black, its margin and a wedge entering the posterior rays hyaline; caudal with a median spotted area near its base, the margin white, the rest of the fin black; anal, ventrals and pectorals each with a light, clouded area at the base, and a broad black band and white margin, which is very narrow on the pectoral.

30. **Pseudopimelodus raninus** (Cuvier and Valenciennes).

Pimelodus raninus Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 157 (Mana; Rio Janeiro).—Kner, SB. Akad. Wiss. Wien, XXVI, 1857, 421 (Barra do Rio Negro; Guaporé; Mattogrosso).

Pseudopimelodus raninus Steindachner, "Flussfische Südamerika's," iv, 1882, 4 (Rio Huallaga).—Eigenmann and Eigenmann, Occasional Papers Cal. Acad. Sci., I, 1890, 111.

Batrachoglanis raninus Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 383 (name only).

No specimens of this species were secured by me. The specimens mentioned by Günther as from the Essequibo do not belong to this species. I examined the types. Three specimens, 91–110 mm. "De la Mana, Leschenault," in the Jardin des Plantes.

Dorsal plate long, nearly touching the occipital process. Dorsal spine smooth; pectoral spine with strong teeth in front and behind, as wide as the spine. Maxillary barbel reaching a little beyond the tip of the humeral spine; a band between the gill-openings, a submedian band on the last dorsal rays, tips of rays hyaline, anal similar, base and subterminal band of caudal dark.

Two of the specimens are nearly uniform dark brown, one has a very distinct band between the gill-openings, and all have the entering wedge of light on the dorsal and anal and have the vertical fins margined with white. Villose as in *villosus*.

All have backward projecting angles to the premaxillary bands of teeth.

MICROGLANIS gen. nov.[11]

Type, *Microglanis pœcilus* sp. nov.

Small Pimelodines, reaching a maximum length of 110 mm., with the head as wide as long, the skull covered by skin only; the occipital crest small; frontal fontanel not extending much if any behind the eye, sometimes a minute occipital fontanel. Eye without a free orbital margin; dorsal and pectoral spines well-developed; *premaxillary patches of teeth without backward projecting angles.*

The species of this genus *parahybæ* and *pulcher* are variegated and marked with three more or less well-defined cross-bands, one over the nape, one behind the dorsal, and one across the caudal peduncle.

31. **Microglanis pœcilus** sp. nov.[12] (Plate XII, fig. 2.)

Eight specimens, 22–37 mm. Below Packeoo Falls. (C. M. Cat. No. 1676 *a* and *b*; I. U. Cat. No. 12055.)

The larger of the two specimens in the Carnegie Museum (*a*) may be considered the type.

Head as wide as long, 3.4 in the length; depth 6; D. I,6; A. 9; eye 2.5 in snout, 8 in head, 3.5 in distance between the eyes.

Head depressed, snout rounded; barbels banded, the maxillary barbel reaching tip of humeral process, post-mental to base of last pectoral ray; mental barbel considerably in advance of the post-mentals; mouth wide, but its angle in front of the eye; lower jaw slightly projecting; anterior nares not tubular.

Distance of dorsal from snout 2.4 in the length, the spine about twice as long as the eye; pectoral spine strong, with large teeth along the entire length of both margins, half of those of the outer margin retrorse, the other half antrorse; ventrals inserted behind the vertical from the last dorsal ray, just reaching the rounded anal; base of dorsal, adipose, and anal about equal in length; upper caudal lobe longer than head.

A light, wavy band across the nape from the pectoral to pectoral; a light spot at base of dorsal spine; a light band downward and backward from behind the dorsal, joining another light band which extends upward but not to the dorsal spine; an oval light area in front of adipose; a light band across caudal peduncle; some light vermiculations about the snout; the light areas sometimes bordered by white, the extent of light and dark brown varying greatly, sometimes one and sometimes the other predominating. Pectoral light, with an oblique dark band; dorsal black,

[11] μίκρος, small, γλάνις, cat-fish.

[12] The duplicates of this new species were distributed as *Batrachoglanis raninus.*

its margin and a wedge near the middle of the posterior rays hyaline; caudal spotted, sometimes a narrow subterminal black band; anal and ventrals spotted; lower surface profusely but faintly spotted.

Brachyglanis[13] gen. nov.

Breviglanis Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 384 (name only).

Type, *Brachyglanis frenata* sp. nov.

Dorsal and pectoral spines well-developed, pungent; skull covered with a thick layer of muscle; ventrals under posterior half of dorsal; caudal forked, the lobes short and about equal; adipose fin not joined to the caudal; anal short; occipital process very short, the skull with a median ridge to near the eye, the fontanel short; eyes small, not strictly superior, without a free orbital notch; premaxillary patch of teeth without a backward projecting angle.

Key to the Species of Brachyglanis.

a. Maxillary barbel in the adult not reaching gill-openings when laid back, to the pectoral in the young; a dark streak from anterior nares through eyes to gill-openings; a light streak in front of dorsal. **frenata.**

aa. Maxillary barbel extending to below the dorsal.

b. Color uniform. . . . . **melas.**

bb. A broad quadrate light spot on the back in front of the dorsal. . . . . **phalacra.**

32. Brachyglanis frenata sp. nov.

Breviglanis frenata Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 384 (name only).

Type, 49 mm. Amatuk. (Carnegie Museum Catalog of Fishes No. 1670.)

Cotypes, two specimens, 41 and 68 mm. Amatuk. (I. U. Cat. No. 12052.)

Head 3.5; depth about 5; D. I,6; A. 7 or 8; eye 2 in the snout, 7.5 in the head, 1.5 in the distance between the eyes.

Tail compressed, depth nearly uniform from caudal peduncle to occiput; head tapering to the flat snout; head slightly rounded above, its width equal to its length exclusive of the part in front of the posterior nares, its depth equal to the postorbital part of the head; angle of mouth below front margin of eye; the tubular anterior nares projecting beyond the upper lip; maxillary barbel in the smallest extending to the pectoral spine, not to gill-opening in the largest; inner mental barbels but slightly in advance of the outer.

Dorsal spine equal to snout and eye or a little less, the dorsal rays of nearly

[13] βραχύς, short, γλάνις, cat-fish.

equal height, 2 in head; distance from snout to dorsal 2.7 in the length; adipose fin beginning at the tip of the dorsal, its margin rounded, free posteriorly; caudal short and very broad; anal short, rounded, its origin near the vertical from the middle of the adipose; pectoral fin reaching ventral, the spine short, pointed, with recurved hooks on both margins.

Light brown, spotted and marbled with darker; a clavate light area in front of the dorsal; a dark streak from the anterior nares to the upper angle of the gill-opening; bases of dorsal and caudal opaque, then abruptly hyaline, the margin of the opaque area of the caudal blackish.

33. **Brachyglanis melas** sp. nov. (Plate XI, fig. 2.)

Breviglanis melas EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 384 (name only).

Type, 60 mm. Crab Falls. (Carnegie Museum Catalog of Fishes No. 1672.)

Cotypes, nine specimens, 36–53 mm. Crab Falls. (C. M. Cat. No. 1673*a–b*; I. U. Cat. No. 12053.)

Cotype, one specimen, 44 mm. Georgetown market. (C. M. Cat. No. 1674*a*.)

Cotypes, two specimens, 32–48 mm. Warraputa. (C. M. Cat. No. 1675*a*; I. U. Cat. No. 12054.)

Head 3.8; depth 5.5–8; D. I,6–9; A. 8, rarely 7. Maxillary barbel extending to below the dorsal; outer mental barbel to base of last pectoral ray or to gill-opening; origin of adipose fin some distance behind the tip of the dorsal, 5–5.5 in the length. Light brown to blue-black; no markings; fins as in *frenata*.

34. **Brachyglanis phalacra** sp. nov. (Plate XII, fig. 1, and Plate XIII, fig. 1.)

Breviglanis phalacra EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 384 (name only).

Type, 81 mm. Amatuk. (Carnegie Museum Catalog of Fishes No. 1671.)

Very similar to *frenata*.

D. I,8; eye 3 in snout, 11 in head, 2 in distance between the eyes; maxillary barbel reaching to below the middle of the dorsal, outer mental barbel to the gill-opening.

Light brown, a dark margin to the opaque portion of the caudal; a large quadrate yellow spot just behind the head, connected with a light bar extending down over the opercle.

Otherwise as in *frenata*.

LEPTOGLANIS[14] gen. nov.

Leptoglanis EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 384 (name only).

Type, *Leptoglanis essequibensis* sp. nov.

First dorsal ray soft or a minute spine; pectoral spine short but strong; origin of ventrals under posterior half of dorsal, far in advance of the middle; adipose fin long and low, continuous with caudal; caudal rounded; anal long; top of head covered with a thick layer of muscle; an oval fontanel at the base of the occipital process; premaxillary patch of teeth subrhomboidal, with the outer posterior angle prolonged backward.

35. **Leptoglanis essequibensis** sp. nov. (Plate XIII, fig. 2.)

Leptoglanis essequibensis EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 384 (name only).

Type, 156 mm. Crab Falls. (Carnegie Museum Catalog of Fishes No. 1652.)

Cotypes, four specimens, 90–170 mm. Crab Falls. (I. U. Cat. No. 12041.)

Cotypes, five specimens, 50–170 mm. Warraputa. (C. M. Cat. No. 1653*a*; I. U. Cat. No. 12042.)

Cotype, one specimen, 66 mm. Konawaruk. (C. M. Cat. No. 1654*a*.)

Head 4–4.9; depth 9.5; D. 7 or I,6; A. 15–17; eye 2.5–3 in snout, 8–11 in head.

Elongate, depth of caudal peduncle equals depth at eyes; depth behind dorsal equals depth of head, which is equal to half its width; occipital crest very short, not nearly reaching dorsal; eye superior; anterior nostrils tubular, extending beyond upper lip; posterior nostrils nearer the eyes than to the anterior; head, and especially the snout, depressed; mouth terminal, the lips thin, plicate; premaxillary patch of teeth subrhomboidal, the outer angle much prolonged, its depth at the middle about 1.5 in its outer edge; an oval fontanel at the base of the occipital process; no frontal fontanel.

Angle of the mouth considerably in advance of the eye; maxillary barbel reaching to middle of dorsal in the adult, farther in the young; outer mental barbels on a line with the angles of the mouth, reaching the opercle; inner mental barbels considerably in advance of the outer, their distance from the edge of the lower lip equal to the distance between the outer barbels; four large pores on the lower lip.

Pectoral spine strong, its length equal to half the length of the head, with teeth along the basal parts of both edges, much stronger in the young; pectorals

[14] λεπτός, slender, γλάνις, cat-fish.

not reaching ventrals; distance from snout to dorsal 3.3–3.4 in the length, the spine evident in the young, less than twice the length of the eye, becoming soft with age; adipose dorsal long and low, connected with a forward extension of the caudal, 3.5 in the length; origin of ventrals near vertical from middle of dorsal or farther back.

Ashy to steel-blue above; fins hyaline.

Myoglanis[15] gen. nov.

Myoglanis Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 384.

Type, *Myoglanis potaroënsis* sp. nov.

First ray of dorsal soft; pectoral spine very strong; skull entirely covered above by a thick layer of muscle; ventrals under posterior half of dorsal; caudal forked, the lower lobe longest; adipose long and low, continued to the caudal, there being no caudal fulcra; a frontal fontanel, scarcely extending beyond the minute eyes; skull behind the fontanel narrow, with a median ridge; occipital crest narrow and short; eyes very small, directed slightly sidewise, mostly upward, no free orbital margin; the two premaxillary patches of teeth forming a crescent; anal long.

It is probable that the *Acentronichthys collettii* of Steindachner belongs to this genus.

36. **Myoglanis potaroënsis** sp. nov. (Plate XIV, fig. 1.)

Myoglanis potaroënsis Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 384 (name only).

Type, about 58 mm. Creek at Tukeit. (Carnegie Museum Catalog of Fishes No. 1664.)

Cotypes, sixteen specimens, the largest 60 mm. Tukeit. (C. M. Cat. No. 1665*a–d*; I. U. Cat. No. 12048.)

Cotypes, three specimens, 99–113 mm. Potaro Landing. (C. M. Cat. No. 1666*a*; I. U. Cat. No. 12049.)

Cotypes, three specimens, 35–40 mm. Waratuk. (C. M. Cat. No. 1667*a*; I. U. Cat. No. 12050.)

Cotype, one specimen, 33 mm. Erukin. (C. M. Cat. No. 1668*a*.)

Cotypes, eight specimens, 32–80 mm. Amatuk. (C. M. Cat. No. 1669*a–b*; I. U. Cat. No. 12051.)

Head 4–4.3; depth 5.3–8; D. 6 to 8; A. 16–21; width of head equals its length without snout; depth of head 2 in its length; eye 14 in head, 3.5 in snout, 5 in space between the eyes.

[15] μῦς, muscle, γλάνις, cat-fish.

Compressed behind, depth from occiput to middle of anal nearly equal; head not greatly depressed, rounded above; occipital process short, its tip a little nearer to the dorsal than to the line between the posterior margins of the eye: anterior nostril very close to the lip; lips very thin, smooth; angle of snout below the eye; maxillary barbel reaching tip of pectoral in the adult, somewhat farther in the young; inner mental barbel in advance of the line joining the outer.

Distance from dorsal to snout 2.6 in the length; tip of dorsal about reaching adipose, which is about 3 in the length; caudal frequently divided to the base, the lower lobe the longer; pectoral spine strong, not quite half the length of the head, with recurved spines on both margins; anal long, the tips of some of the rays reaching caudal, its base 3.5–4 in the length.

Purplish brown, lighter below, the rayed fins lighter. No distinct markings.

Chasmocranus[16] gen. nov.

Chasmocephalus Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 384 (name only, preoccupied).

Type, *Chasmocranus longior* sp. nov.

First rays of pectoral and dorsal soft; origin of ventrals under origin of dorsal or but slightly behind it, far in advance of the middle; caudal forked; top of skull covered with skin only; fontanel narrow, extending to the base of the occipital, interrupted over the eyes and again some distance behind the eyes; occipital crest short and narrow; eyes superior, without a free orbital margin; adipose fin low, not connected with the caudal; premaxillary patch of teeth subrhomboidal, its outer posterior angle extended backward; anal short.

Closely allied to *Heptapterus* and *Acentronichthys*.

Key to the Species of Chasmocranus.

a. Adipose fin 3.5–4.5 in the length..... longior.
aa. Adipose fin about 6 in the length..... brevior.

37. Chasmocranus longior sp. nov. (Plate XIV, fig. 2.)

Chasmocephalus longior Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 384 (name only).

Type, 110 mm. Amatuk. (Carnegie Museum Catalog of Fishes No. 1655.)

Cotypes, twelve specimens, 40–93 mm. Amatuk. (C. M. Cat. No. 1656*a–c*; I. U. Cat. No. 12043.)

Cotypes, three specimens, 95–129 mm. Maripicru? (C. M. Cat. No. 1657*a*; I. U. Cat. No. 12044.)

[16] χάσμα, a gaping, κράνον, head.

Cotype, one specimen, 89 mm. Waratuk. (C. M. Cat. No. 1658*a*.)

Cotypes, two specimens, 67 and 68 mm. Konawaruk. (C. M. Cat. No. 1659*a*; I. U. Cat. No. 12046.)

Cotypes, twelve specimens, 38–83 mm. Warraputa. (C. M. Cat. No. 1660 *a–c*; I. U. Cat. No. 12046.)

One specimen, 60 mm. Warraputa. (C. M. Cat. No. 1661*a*.) This may prove to be distinct.

Very similar to *Leptoglanis*.

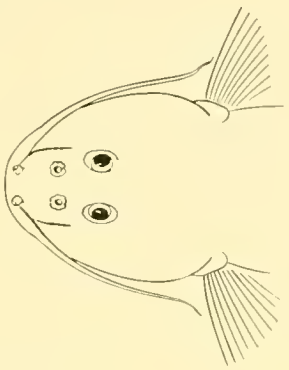

Fig. 33. *Chasmocranus longior* Eigenmann. *Type*. C. M. Cat. No. 1655.

Head 4.5–5; depth 9–10; D. 7; A. usually 11 or 12, rarely 10; width of head less than its length, its depth 2 or 3 in its length; eye 6–7 in head, 2–2.66 in snout, 1–1.33 in distance between the eyes.

Head depressed, tail compressed; tip of occipital crest about equidistant from snout and dorsal; anterior nostril nearer the snout than to posterior nostril; lips thin, plicate; mouth terminal, its angle about midway between anterior and posterior nostrils; depth of premaxillary patch of teeth about 1.5 in the length of its outer margin; maxillary barbel extending to or a little beyond origin of pectoral; outer and inner mental barbels in a straight line, their distance from the edge of the lower lip equal to the distance between the inner barbels.

Distance of dorsal from tip of snout 2.5–2.66 in the length, the rays from the second to the sixth of about equal height; ventrals and dorsal equidistant from tip of snout; pectorals rounded, equal to head less snout in length; origin of anal under origin of adipose, its base long, last but fourth ray highest or of equal height with those immediately in front of it; caudal slightly forked, the lobes rounded, of nearly equal length, considerably less than length of head.

Dark brown to black; sometimes a light streak across back from gill-opening to gill-opening; a light spot at base of first dorsal ray; fins light brown or blackish with white margins.

38. **Chasmocranus brevior** sp. nov. (Plate XV, fig. 1.)

Chasmocephalus brevior Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 384 (name only).

Type, 56 mm. Waratuk. (Carnegie Museum Catalog of Fishes No. 1662*a*.)

Cotypes, two specimens, 69 mm. Waratuk. (I. U. Cat. No. 12047.)

? One specimen, 23 mm. Amatuk. (C. M. Cat. No. 1663*a*.)

This species differs from *longior* in having more pointed caudal lobes, and especially in the length of the adipose fin, which is contained six times in the length.

Rhamdia Bleeker.

Pimelodus Lacépède, Hist. Nat. Poiss., V, 1803, — (sp.).—Cuvier, Règne Animal, II, 1817, 203 (sp.).—Günther, Catalogue, V, 1864, 114 (sp.).

Pteronotus Swainson, Class. Fishes, Amph., and Rept., II, 1839, 309 (*5-tentaculatus*), preoccupied in mollusks.

Rhamdia Bleeker, Icth. Arch. Ind. Prodr., I, 1858, 197, 207 (sp.); Nederl. Tijdschr. Dierk., I, 1863, 101 (*queleni*).

Pimelonotus Gill, Ann. Lyc. Nat. Hist. N. Y., VI, 1858, 391 (*vilsoni*).

Notoglanis Günther, Catalogue, V, 1864, 136 (*multiradiatus*).

Type, *Pimelodus quelen* Quoy and Gaimard.

Eye with a free orbital margin. Teeth on vomer none or minute; occipital process short, not reaching the dorsal plate; no parietal fontanel; head covered with skin, not granular; caudal forked; barbels terete.

Key to the Guiana Species of Rhamdia.

a. D. I,6 or 7.

b. Premaxillary band of teeth rounded laterally.

c. Maxillary barbel not or very rarely extending to middle of adipose. Space between the eyes 2.2–2.6 in the head, both caudal lobes rounded, not quite as long as head, the sixth ray of the upper lobe from the median cleft longest; eye 3 in the snout, 6.5–7 in the head, 3 in the space between the eyes; adipose dorsal 2.5 in the length..... **quelen.**

cc. Maxillary barbel extending past middle of adipose; upper caudal lobe pointed; the fifth ray of the upper lobe from the median cleft longest; space between the eyes about 2.33 in the head..... **sebæ.**

bb. Premaxillary band of teeth with a backward projecting angle laterally. Maxillary barbel not extending to middle of adipose; space between the eyes 3 in the head; caudal cleft, both lobes rounded, the third or fourth ray from the cleft in the upper lobe longest; adipose dorsal 2–2.4 in the length..... **holomelas.**

aa. D. I,10; A.6; maxillary barbel to tip of ventrals..... **arekaima.**

39. **Rhamdia quelen** (Quoy and Gaimard).

Pimelodus quelen Quoy and Gaimard, Voy. Uranie, Zool., 1824, pl. 49, figs. 3–4.

Rhamdia quelen Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 126 (Santa Clara; Rio Mucuri; Juiz de Fora; Campos; Rio Jequitinhonha; Mendez; Rio de Janeiro; Macacos; São Matheos; Rio Parahyba; Cannavierias; Rio Grande do Sul); Occasional Papers Cal. Acad. Sci., I, 1890, 127; Proc. U. S. Nat. Mus., XIV, 1891, 28.—Berg, An. Mus. Nac. Buenos Aires, IV, 1895, 133.—Eigenmann and Norris, Rev. Mus. Paulista, IV, 1900, 350 (Taubaté).—Eigenmann and Kennedy, Proc. Acad. Nat. Sci. Phila., 1903, 499 (Estancia la Armonia; Asuncion; Campo Grande).—Eigenmann and Bean, Proc. U. S. Nat. Mus., XXXI, 1907, 660 (Amazon).—Eigenmann, Ann. Carnegie Mus., IV, 1907, 113 (Corumbá); Repts. Princeton Univ. Exp. Patagonia, III, 1910, 386.

Rhamdia queleni Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 101 (name only).

Pimelodus queleni Günther, Catalogue, V, 1864, 123 (Brazil).—Boulenger, Boll. Mus. Zool. Anat. Comp. Torino, XV, 1900,—(Carandasiñho).

Pimelodus (Rhamdia) queleni Steindachner, "Süsswasserfische Südöstlichen Brasilien," iii, 1876, 64 (Rio Parahyba, near Juiz de Fora; Campos; Rio Doce; Porto Alegre; Cannavierias; Amazon, near Pará; Bahia).

Heterobranchus sextentaculatus Agassiz, Selecta Gen. et Spec. Pisc. Bras., 1829, 28, pl. 11 (12 in. long; locality ?).

Pimelodus sellonis Müller and Troschel, Horæ Ichth., III, 1849, 2 (Brazil).

? *Pimelodus bahianus* Castelnau, Anim. Am. Sud, Poiss., 1855, 35, pl. 16, fig. 2 (Bahia).

Pimelodus sebæ Kner, SB. Akad. Wiss. Wien, XXVI, 1857, 417, fig. 19 (Maarbitanos).

Silurus sapipoca (*ex* Natterer, MS.) Kner, SB. Akad. Wiss. Wien., XXVI, 1857, 418.

Pimelodus wuchereri Günther, Catalogue, V, 1864, 123 (Bahia).

Pimelodus (Rhamdia) queleni cuprea Steindachner, "Süsswasserfische Südöstlichen Brasilien," iii, 1876, 65 (Juiz de Fora).

Pimelodus (Rhamdia) cuyabæ Steindachner, "Süsswasserfische Südöstlichen Brasilien," iii, 1876, 75, footnote (Cuyabá).

Six specimens, 112–169 mm. Gatuck Creek, Potaro Highlands. (C. M. Cat. No. 1594*a–b*; I. U. Cat. No. 11999.)

Forty-one specimens, 71–230 mm. Aruataima. (C. M. Cat. No. 1595*a–i*; I. U. Cat. No. 12000.)

Six specimens, 107–184 mm. Yackeatonuk Fall, Potaro River. (C. M. Cat. No. 1596*a–b*; I. U. Cat. No. 12001.)

Eight specimens, 86–168 mm. Nickaparu Creek. (C. M. Cat. No. 1604*a–c*; I. U. Cat. No. 12002.)

Fifteen specimens, 80–219 mm. Guiana, label not legible, collected by Indians in the upper Potaro or upper Rupununi. (C. M. Cat. No. 1605*a–e*; I. U. Cat. No. 12005.)

One specimen, 215 mm. Potaro Landing. (C. M. Cat. No. 1597*a*.)

Thirteen specimens, 78–164 mm. Holmia, creeks. (C. M. Cat. No. 1598*a–e*; I. U. Cat. No. 12003.)

Three specimens, 205–242 mm. Chipoo Creek, branch of the Ireng. (C. M. Cat. No. 1599*a*; I. U. Cat. No. 12004.)

This species inhabits the plateaus of Guiana. It has not been recorded from Guiana before. It is very closely allied to *sebæ*, from which it differs principally in its longer maxillary barbel.

Head 4.16–4.5; depth 5–4.3; D. I,6; A. 11.

Head about an orbital diameter longer than broad; eye in middle of head, 6.5 in head in adult, 2.5 in interorbital; maxillary barbel reaching middle of adipose in the young, not to middle in the old; outer or post-mental barbel not reaching beyond pectoral; dorsal spine equaling snout in adult; pectoral spine a little longer; spines *shorter* in the young; adipose fin half of the length without the head; caudal cleft to its base, the upper lobe narrower, both lobes rounded, equal to the head. Ashy above, blotched with darker; base of dorsal opaque at base, then hyaline, darker above; other fins uniform.

40. Rhamdia sebæ (Cuvier and Valenciennes).

"Rhamdia ou bagre de rio" Marcgrave, Hist. Rer. Nat. Bras., IV, 1648, 149.

——— Seba, Locupl. Rer. Nat. Thes. Acc. Descr., III, 1748, pl. 29, fig. 5.

"Mystus" No. 83, Gronow, Mus. Ichth., I, 1754, 34; No. 384, Zoophyl., 1763, 125.

Pimelodus sebæ Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 169 (Surinam; Cayenne; Rio Janeiro; Buenos Aires).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 628 (all Guiana rivers).—Hyrtl, Denkschr. Akad. Wiss. Wien, XVI, 1859, 16 (vertebræ 11 + 2 + 26).—Quoy and Gaimard, Voy. Uranie et Physicienne, Zool., 1824, 228, pl. 49, figs. 3 and 4.—Günther, Catalogue, V, 1864, 119 (Demerara; British Guiana; Brazil).

Pimelodus (*Rhamdia*) *sebæ* Steindachner, "Süsswasserfische Südöstlichen Brasilien," iii, 1876, 68 (Demerara; Essequibo; St. Martha, mouth of

Magdalena); "Fisch-Fauna Magdalenen-Stromes," 1878, 17 (Magdalena); "Fisch-Fauna des Cauca," etc., 1880, 7 (Cauca).

Rhamdia sebæ Eigenmann and Eigenmann, Proc. Cal. Acad. Sci. (2), I, 1888, 126 (Tonantins; Gurupa; Rio Janeiro; Bahia; Xingu; Santa Cruz; Cudajas; São Matheos; Rio Doce; Serpa; Tabatinga; Goyaz; Pará; Teffé; Surinam; Villa Bella); Occasional Papers Cal. Acad. Sci., I, 1890, 123; Proc. U. S. Nat. Mus., XIV, 1891, 28.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 385.

Pimelodus stegelichii Mülle and Troschel, in Schomburgk, Reisen, III, 1848, 628 (forest brooks); Horæ Ichth., III, 1849, 3 (Surinam).—Günther, Catalogue, V, 1864, 121 (Demerara; Surinam).

Pimelodus musculus Müller and Troschel, Horæ Ichth., III, 1849, 4 (America).

Pimelodus mülleri Günther, Catalogue, V, 1864, 119 (River Capin; Pará; Surinam).

Rhamdia queleni Bleeker (not of Quoy and Gaimard), "Silures de Suriname," 1864, 75 (Surinam).

Twenty-nine specimens, 96–246 mm. Mud creek in Aruka River. (C. M. Cat. No. 1588*a–e*; I. U. Cat. No. 11194.)

One specimen, 119 mm. Below Packeoo Falls, Essequibo. (C. M. Cat. No. 1589*a*.)

Seven specimens, 118–226 mm. Creek in Barima River. (C. M. Cat. No. 1590*a–b*; I. U. Cat. No. 11995.)

Five specimens, 150–280 mm. Creek in Mora Passage. (C. M. Cat. No. 1591*a–b*; I. U. Cat. No. 11996.)

Fourteen specimens, 129–228 mm. Gluck Island, Rockstone. (C. M. Cat. No. 1592*a–e*; I. U. Cat. No. 11997.)

One specimen, 153 mm. Kumaka. (C. M. Cat. No. 1593.)

One specimen, 294 mm. Lama Stop-Off. (I. U. Cat. No. 11998.)

One specimen, 200 mm. Georgetown, mud-flats. (C. M. Cat. No. 1601.)

One specimen, 220 mm. Botanic Gardens. (C. M. Cat. No. 1602.)

One specimen, 244 mm. Wismar. (C. M. Cat. No. 1603.)

I have also examined the types of *stegelichii* in Berlin.

Head 4–4.25; depth 3.3–5.16; D. I,6; A. 10–12; eye in the middle or slightly in advance of the middle of the head, 6–6.5 in the head in the adult, 2–2.5 in the interorbital; maxillary barbel reaching beyond middle of adipose, to tip of caudal in some young; post-mental barbels to tip of pectoral or beyond origin of ventral. Dorsal spine somewhat longer than snout in adult (shorter in young); pectoral spine somewhat longer than snout and eye in the adult; adipose fin nearly half the

length from eye to caudal. Upper caudal lobe more pointed than in *quelen*, equal to the length of the head. Ashy to black, with darker mottlings, or plain, otherwise as in *quelen*.

One of the types, 262 mm. long, in the Jardin des Plantes has the maxillary barbel extending to the second third of the adipose only (the specimen mentioned by Cuvier and Valenciennes from Guayaquil is another species), upper caudal lobes rounded, the fourth ray longest.

41. Rhamdia holomelas (Günther).

Pimelodus holomelas Günther, Ann. and Mag. Nat. Hist., (3), XXII, 1863, 442 (Essequibo); Catalogue, V, 1864, 120 (Essequibo).

I have examined the types in the British Museum and seven specimens, 275–345 mm. Lama Stop-Off. (C. M. Cat. No. 1600*a* and 2227*a–c*; I. U. Cat. No. 12413.)

Head 4–4.2; depth 5.5–5.66; D. 6; A. 11–13; adipose dorsal 2–2.4 in the length.

Head about an orbital diameter longer than broad, its depth half of its length; interorbital flat, the snout distinctly depressed, the upper jaw longer; premaxillary band of teeth five and a half times as long as deep, a distinct backward projecting angle laterally; maxillary barbel extending beyond the base of the pectoral but not to its tip, post-mental a little beyond the base of the pectoral. Caudal cleft to the base, one short ray on either side of the cleft; the second ray of the upper lobe nearly as long as the third and fourth; both lobes rounded; pectoral spine equal to the postorbital portion of the head or a little longer, with retrorse hooks in front, slightly rough near the middle behind. Black, with obscure marblings.

42. Rhamdia arekaima (Schomburgk).

Pimelodus arekaima Schomburgk, Fishes Brit. Guiana, I, 1841, 178 (not pl. 5), (Upper Essequibo).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 643 (all rivers of the savannah).

Pimelodus multiradiatus Kner, SB. Akad. Wiss. Wien, XXVI, 1857, 414 (Borba on the Rio Madeira; Forte do Rio Branco on the Rio Takutu).

Notoglanis multiradiatus Günther, Catalogue, V, 1864, 136 (copied).

Rhamdia multiradiatus Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 126 (name); Occasional Papers Cal. Acad. Sci., I, 1890, 130.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 386, part.

Habitat, Amazon and its tributaries, and northward.

This species is placed here on the authority of Schomburgk. The plate of Schomburgk's *arekaima* is apparently *Pimelodus clarias* and the description does not fit it. The specimen from which the drawing was made was said to be two feet three inches long, of fine flavor, and called "Tiger fish."

RHAMDELLA Eigenmann and Eigenmann.

Rhamdella EIGENMANN and EIGENMANN, Proc. Cal. Acad. Sci., (2), I, 1888, 129 (*eriarcha*).

Type, *Rhamdella eriarcha* EIGENMANN and EIGENMANN.

This genus differs from *Rhamdia* in the presence of a long slit-like parietal fontanel. Most of the species are found in southeastern Brazil.

43. **Rhamdella foina** (Müller and Troschel).

Pimelodus foina MÜLLER and TROSCHEL, in Schomburgk, Reisen, III, 1848, 628 (Takutu); Horæ Ichth., III, 1849, 5 (Guiana).—GÜNTHER, Catalogue, V, 1864, 130 (copied).

Rhamdia foina EIGENMANN and EIGENMANN, Proc. Cal. Acad. Sci., (2), I, 1888, 126 (name); Occasional Papers Cal. Acad. Sci., I, 1890, 126; Proc. U. S. Nat. Mus., XIV, 1891, 28.—EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 386.

This species has been taken but once before; I have examined the type in Berlin and five specimens, 141–201 mm. Warraputa Cataract. (C. M. Cat. No. 1587*a–b*; I. U. Cat. No. 12007.)

Head 4; depth 5–6.5; D. I, 6; A. 10.

Head much depressed, its depth equal to eye and postorbital part of head, its width equal to the length behind the maxillary barbel; head evenly arched from its lower margin to its lower margin, the eyes directed upward and outward, 4 in the head, two-thirds of the interorbital; occipital fontanel long and narrow; occipital process very short, extending about one-fourth of the distance to the dorsal spine. Premaxillary teeth fine, in a band of about equal width throughout. Maxillary barbel extending slightly beyond tip of pectoral; post-mental a little beyond their base.

Dorsal spine two-fifths the length of the head; base of dorsal a little less than its distance from the adipose, which is 3.5 in the length. Caudal forked, not cleft to its base, the lower lobe rounded, the upper lobe pointed, .4 longer than the lower, 3.5 in the length; depth of caudal peduncle about half its length.

Uniform blue-black to mottled ashy; dorsal uniform or its base darker.

PIMELODELLA Eigenmann and Eigenmann.

Pseudorhamdia STEINDACHNER, "Süsswasserfische Südöstlichen Brasilien," iii, 1876, 46 (*lateristriga*), not *Pseudorhamdia* Bleeker.

Pimelodella EIGENMANN and EIGENMANN, Proc. Cal. Acad. Sci., (2), I, 1888, 131 (*cristatus*).

Type, *Pimelodus cristatus* Müller and Troschel.

Similar to *Pimelodus*, but with a parietal fontanel persistent throughout life; the occipital process not tapering, but of nearly uniform width, in contact with the dorsal plate behind; no vomerine teeth.

Species usually slender and of small size.

KEY TO THE GUIANA SPECIES OF PIMELODELLA.

a. Adipose fin 2.33–2.5 in the length. A narrow lateral band, conspicuous in young, becoming obscure with age. Maxillary barbels to below middle of adipose or beyond tip of caudal.....**cristata.**

aa. Adipose fin 3 or more in the length.

b. Eye 2.5 in the head, longer than snout; interorbital 2 in the eye; maxillary barbel reaching end of adipose or caudal; caudal lobes long, slender, the lower 3 in the length; pectoral spine little shorter than head.....**megalops.**

bb. Eye 3.5 in head, shorter than snout; tip of dorsal dusky; maxillary barbel reaching middle of adipose; pectoral spine about equal to snout and eye.....**macturki.**

44. Pimelodella cristata (Müller and Troschel).

? *Pimelodus insignis* SCHOMBURGK, Fishes Brit. Guiana, I, 1841, 180 (not plate).—MÜLLER and TROSCHEL, in Schomburgk, Reisen, III, 1848, 643 (Takutu and Rio Branco).

Pimelodus cristatus MÜLLER and TROSCHEL, in Schomburgk, Reisen, III, 1848, 628 (Takutu and Mahu Rivers); Horæ Ichth., III, 1849, 4 (Guiana, in Essequibo).—GÜNTHER, Catalogue, V, 1864, 117 (Guiana; Essequibo; River Capin, Pará).—VAILLANT, Bull. Soc. Philom., (7), IV, 1880, 152 (Calderon).—STEINDACHNER, "Flussfische Südamerika's," iv, 1882, 4 (Rio Huallaga).—? PERUGIA, Ann. Mus. Genova, (2), X, 1891, 631 (Tucuman).

Pimelodella cristata EIGENMANN and EIGENMANN, Proc. Cal. Acad. Sci., (2), I, 1888, 132 (San Gonçallo; Avary; Villa Bella; Jutahy; Tapajos; Rio Mucuri; Tabatinga; Hyavary; Coary); Occasional Papers Cal. Acad. Sci., I, 1890, 150.—EIGENMANN and BEAN, Proc. U. S. Nat. Mus., XXXI, 1907, 660 (Amazon).—EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 388.

Pimelodus agassizii STEINDACHNER, "Icthyologische Beiträge," v, 1876, 99 (Peruvian Amazon; Hyavary).

Pimelodus (Pseudorhamdia) wesselii STEINDACHNER, "Süsswasserfische Südöstlichen Brasilien," iii, 1876, 56, footnote (Essequibo).

? *Pimelodella wesselii* EIGENMANN and EIGENMANN, Proc. Cal. Acad. Sci., (2), I, 1888, 132 (Cudajas; Pará; Marajo; Rio Madeira; Rio Puty; Santarem); Occasional Papers Cal. Acad. Sci., I, 1890, 152.

Pimelodus ophthalmicus COPE, Proc. Am. Philos. Soc., XVII, 1878, 675 (Upper Amazon).

Without opening the question whether the specimens recorded by Eigenmann and Eigenmann as *cristatus* and *wesselii* belong to distinct species, I am inclined to consider the *wesselii* of Steindachner as a synonym of the *cristatus* of Müller and Troschel. I have examined the type of *cristatus* and:

Twelve specimens, 81–137 mm. Tumatumari. (C. M. Cat. No. 1686*a–d*; I. U. Cat. No. 12062.)

One specimen, 145 mm. Below Packeoo Falls. (C. M. Cat. No. 1687.)

One specimen, 105 mm. Rockstone. (C. M. Cat. No. 1688.)

Two specimens, 115–150 mm. Konawaruk. (C. M. Cat. No. 1689; I. U. Cat. No. 12063.)

Twelve specimens, 160–205 mm. Creek below Potaro Landing. (C. M. Cat. No. 1690*a–d*; I. U. Cat. No. 12064.)

Two specimens, 133–158 mm. Twoca Pan. (C. M. Cat. No. 1691*a*; I. U. Cat. No. 12065.)

Essequibo and creeks of the interior, most abundant in the lower Potaro River.

Head 4.5; depth 4.5–5.75; D. I,6; A. 13–15; adipose fin 2.25–2.4; eye 3.5–4 in the head, interorbital 4.25–5; half the eye or all of it in the posterior half of the head.

Occipital crest more than three times as long as wide, reaching the dorsal plate; fontanels of about equal width, the posterior becoming very narrow behind; maxillary barbels extending to the base of the caudal or slightly beyond its tip; outer mental barbels reaching ventrals or in the largest specimens a little shorter.

Dorsal rounded, the spine slender, about equal to the fourth ray in height; anterior margin of the dorsal spine with recurved notches on its distal half or less, posterior margin with small recurved hooks; interspace between the dorsals about equal to the eye; caudal deeply forked, frequently split to the base, the lower lobe much the broader; ventrals not reaching anal; pectoral not to ventral; pectoral spine with small hooks along the posterior margin, its anterior margin rough, with recurved notches on distal half. A narrow blue-black stripe from below origin of dorsal, disappearing near caudal, and becoming obscure with age; dorsal with the usual hyaline band.

45. **Pimelodella megalops** sp. nov. (Plate XV, fig. 2.)

Pimelodella megalops Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 389.

Type, 100 mm. Tumatumari. (Carnegie Museum Catalog of Fishes No. 1692.)

Cotypes, fifty-six specimens, 67–96 mm. Tumatumari. (C. M. Cat. No. 1693*a–e*; I. U. Cat. No. 12066.)

Three specimens, 56–90 mm. Crab Falls. (C. M. Cat. No. 1694; I. U. Cat. No. 12067.)

Allied to *macturki*, but with a distinctly larger eye and a longer and more slender lower caudal lobe.

Head 4.75–5; depth 6.5–7; D. I,6; A. 11 to 13; adipose fin 3.33 in the length; eye 2.5 in the head, its center a little behind the middle of the head; interorbital 5.5 in the head.

Width of occipital crest 2.5–3 in its length, reaching dorsal plate; posterior fontanel considerably wider than the anterior for a short distance, narrowed backward; maxillary barbel reaching to near end of adipose or base of caudal; outer mental barbels reaching the ventrals.

Dorsal spine slender, equal to the third or fourth ray in height; a few scarcely evident recurved notches near the tip in front, and fine recurved teeth for nearly its entire length behind; space between the dorsals considerably greater than the large eye; caudal very widely forked and sometimes split to the base, the lower lobe longer than the upper by nearly the length of the eye, 2.75–3 in the length; pectoral spine but little shorter than head, with minute straight teeth along its anterior margin to the tip, where they are replaced by recurved hooks, posterior margin with about eighteen recurved spines near the tip, the spines largest near the middle.

A dark median band; dorsal hyaline, a narrow streak of chromatophores along the front of each ray.

46. **Pimelodella macturki** sp. nov. (Plate XVI, fig. 1.)

Pimelodella macturkii Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 389.

Type, 69 mm. Creek in Mora Passage. (Carnegie Museum Catalog of Fishes No. 1695.)

Cotypes, fourteen specimens, 46–76 mm. Creek in Mora Passage. (C. M. Cat. No. 1696*a–e*; I. U. Cat. No. 12068.)

Cotypes, two specimens, 66 and 65 mm. Georgetown trenches. (C. M. Cat. No. 1697; I. U. Cat. No. 12069.)

Cotypes, fifteen specimens, 49–71 mm. Choca trenches at Morowhanna. (C. M. Cat. No. 1698*a–d*; I. U. Cat. No. 12070.)

This species takes the place of *cristata* along the coast from Georgetown to Morowhanna. It differs notably in the length of the adipose and barbels, the color of the dorsal, and the serration on the pectoral spine.

Head 4–4.5; depth 5.25; dorsal I,6; A. 10–13; adipose fin 3.5–4 in the length; eye 3.33–4; interorbital 4.5; eye about in middle of the head.

Occipital crest more than three times as long as wide, reaching the dorsal plate; fontanels of about equal width, the posterior becoming narrower backward; maxillary barbel reaching origin or end of base of anal; outer mental barbel to near tip of pectoral or a little shorter.

Dorsal low, rounded, the spine equal to the third or fourth ray, rough near the tip in front and on the distal half of the posterior margin; space between the dorsals much greater than the eye; caudal deeply forked, the lower lobe broader, a little longer than the head, 3.5 in the length; ventrals not reaching anal; pectorals not to ventrals; pectoral spine equal to snout and eye in length or a little longer, with minute teeth along its anterior margin to near the tip, with twelve long recurved spines along the middle of its posterior margin, the larger nearest the tip.

An obscure lateral stripe; tip of caudal dusky.

Pimelodus Lacépède.

Pimelodus Lacépède, Hist. Nat. Poiss., V, 1803,—(species of several genera).—Cuvier, Règne Animal, II, 1817, 203 (species having a single band of teeth in the upper jaw).—Swainson, Class. Fishes, Amph., and Rept., II, 1839, 305 (*quadrimaculatus*).—Lütken, Dan. Vidensk.-Selsk., Skr., (5), XII, 1875, 163 (*maculatus* = *clarias*).

Pseudariodes Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 99 (*clarias*).

Pseudorhamdia Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 101 (*maculatus* = *clarias*).

Pseudorhamdia Lütken, Dan. Vidensk.-Selsk. Skr., (5), XII, 1875, 49, 169 (*fur*).

Type, *Pimelodus maculatus* Lacépède.

Eye with a free orbital margin; teeth on vomer none or minute; occipital process reaching the dorsal plate; no parietal fontanel; head covered with thin skin, granular; caudal forked; humeral process broad; barbels terete.

Key to the Guiana Species of Pimelodus.

a. Adipose dorsal about 4 or more than 4 in the length.

b. Occipital process broad at base, tapering to the dorsal plate.

c. Pectoral spine smooth or nearly smooth in front. Dorsal without a conspicuous spot; sides spotted, striped or plain; snout narrowed, its width less than half the length of the head; posterior nares large; upper jaw but little projecting; dorsal spine reaching considerably beyond tip of last ray. . . . . **clarias.**

cc. Pectoral spine with antrorse teeth in front and retrorse teeth behind. Dorsal with a conspicuous black blotch near the middle of the front half of the fin; a light streak from

dorsal spine to above ventral and then back to the middle caudal rays, another light streak above it; snout broad, depressed, the width of the mouth about half the length of the head; posterior nares small; upper jaw considerably projecting; dorsal spine not nearly reaching tip of last ray.....ornatus.

bb. Occipital process narrow at the base, scarcely tapering to the tip; pectoral spine with retrorse teeth on the basal half of the posterior margin; without conspicuous markings, the chromatophores in an area between the anal and dorsal aggregated along the septa..heteropleurus.

aa. Adipose dorsal very long, 2.4–2.6 in the length; caudal lobes produced, twice as long as the head, maxillary barbels extending much beyond the tips of the caudal.....altipinnis.

47. Pimelodus clarias (Bloch).

Silurus clarias Bloch, Ausl. Fische, 1795, pl. 35, figs. 1–2 = *Silurus clarias* Linnæus in part; not *Silurus clarias* Hasselquist, which is *Synodontis clarias* from the Nile.

Pimelodus clarias Lacépède, Hist. Nat. Poiss., V, 1803, 93 (? 8 dorsal rays); Castelnau, Anim. Am. Sud, Poiss., 1855, 34 (Crixas; Araguay; Ucayale; Amazon).—Steindachner, "Fisch-Fauna Magdalenen-Stromes," 1878, 15 (Magdalena River); "Flussfische Südamerika's," xiv, 1882, 4 (Rio Huallaga).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 134.—Eigenmann, Ann. N. Y. Acad. Sci., VII, 1894, 633 (Rio Grande do Sul).—Eigenmann and Norris, Rev. Mus. Paulista, IV, 1900, 353 (Iguapé).—Eigenmann and Kennedy, Proc. Acad. Nat. Sci. Phila., 1903, 499 (Asuncion; Arroyo Trementina).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 388.

Bagrus (Ariodes) clarias Müller and Troschel, in Schomburgk, Reisen, III, 1848, 627 (Waini and Barima).

Ariodes clarias Müller and Troschel, Horæ Ichth., III, 1849, 10 (British Guiana).—Kner, SB. Akad. Wiss. Wien, XXVI, 1857, 413.

Pseudariodes clarias Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 99 (name only).—Lütken, Vid. Med. Naturhist. For. Kjöbenhavn, 1874, 194, 199 (Guiana).

Silurus callarias Bloch and Schneider, Syst. Ichth., 1801, 379, part.

Pimelodus maculatus Lacépède, Hist. Nat. Poiss., V, 1801, 94, 107 (Rio Plata).—Valenciennes, in d'Orbigny, Voy. Am. Mer., V, ii, 1847, pl. 1, figs. 1–3 (La Plata to Mexico, Lake Maracaibo).—Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 192 (Cayenne; Maracaibo).—Schomburgk, Fishes Brit. Guiana, I, 1841, 175 (Rivers of Guiana generally; Rio Negro; Amazon).—Steindachner, "Ichthyologische Notizen," vi, 1867, 32 (La Plata); ix, 1869, 6 (Montevideo).—Hensel, Archiv für Naturg., I, 1870, 69 (Jacuhy).—Lütken, Dan. Vidensk.-Selsk. Skr., (5), XII, 1875, 163, fig. (Rio das Velhas).—Steindachner, "Süsswasserfische Südöstlichen Brasilien," iii, 1876, 40 (La Plata; Rio San Fran-

cisco; Rio das Velhas; Amazon between Pará and Santarem; Rio Grande do Sul; Porto Alegre).—Peters, MB. Akad. Wiss. Berlin, 1877, 470 (Calabozo).—Boulenger, Proc. Zool. Soc. London, 1891, 233 (Rio Grande do Sul).—Perugia, Ann. Mus. Genova, (2), X, 1891, 630 (Rio Durazno; Rio de La Plata; Paraguay; Parana; Montevideo; Buenos Aires).—von Ihering, Süsswasserfische Rio Grande do Sul, 1893, 17.—Lahille, Rev. Mus. la Plata, VI, 1895, 271 (very abundant everywhere in La Plata).—Boulenger, Boll. Mus. Zool. ed Anat. Comp. Torino, XII, 1897 (Mission San Francisco).—Perugia, Ann. Mus. Genova, (2), XVIII, 1897, 149,—(Puerto 14 de Mayo).—Pellegrin, Bull. Mus. d'Hist. Nat., V, 1899, 157 (Apuré).—Vaillant, Nouv. Arch. Mus. d'Hist. Nat. (4), 1900, 124 (Carsevenne, French Guiana).—Steindachner and von Bayern, Denkschr. Akad. Wiss. Wien, LXXII, 1902, 135.—Eigenmann and Bean, Proc. U. S. Nat. Mus., XXXI, 1907, 668 (Amazon); Eigenmann, Ann. Carnegie Mus., IV, 1907, 115 (Porto Murtinho; Bahia Negra; Corumbá).

Pimelodus rigidus Agassiz, Selecta Gen. et Spec. Bras., 1829, 19, pl. 7, fig. 2.

Pimelodus blochii Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 188 (Cayenne; (Surinam).

Paramutana blochii Günther, Catalogue, V, 1864, 111 (copied).—Vaillant, Bull. Soc. Philom., (7), IV, 1880, 152 (Calderon).

? *Pimelodus arekaima* Schomburgk, Fishes Brit. Guiana, I, 1841, 178, plate, not descr. (Essequibo).

Mystus ascita Gronow, Cat. Fish, ed. Gray, 1854, 156 (based on Mus. Ichth., I, 1754, 35; Zoophyl., I, 1763, 125, No. 385).

Pimelodus schomburgkii Bleeker, Ichth. Arch. Ind. Prodr., I, 1858, 208 (for *B. maculatus* Schomburgk).

Pseudorhamdia ascita Bleeker, Versl. en Med. Acad. Wet. Amsterdam, XIV, 1862, 384 (Surinam).

Pimelodus macronema Bleeker, "Silures de Suriname," 1864, 79, pl. 14 (Surinam).

Pseudorhamdia piscatrix Cope, Proc. Am. Philos. Soc., XI, 1870, 569 (Pebas); Proc. Acad. Nat. Sci. Phila., 1872, 262 (Ambyiacu River); Proc. Am. Philos. Soc., XVII, 1878, 674 (Peruvian Amazon).

Pscudariodes pantherinus Lütken, Vid. Med. Naturhist. For. Kjöbenhavn, 1874, 192, 199 (Venezuela).

Pscudariodes albicans Lütken, Vid. Med. Naturhist. For. Kjöbenhavn, 1874, 194, 198, not *Airus albicans* Valenciennes (La Plata and its tributaries).—Steindachner, "Fisch-Fauna Magdalenen-Stromes," 1878, 61, note.

Piramutana macrospila Günther, Ann. and Mag. Nat. Hist. (5), VI, 1880, 10, pl. 2 (Rio Plata).

The following is a general description, applicable to all the varieties.

Head 3.75–3.85; depth 4–4.2; D. I,6; A. 12 or 13.

Top of head, occipital process, dorsal plate and humeral process granular; profile steep, rising with more or less of an angle from the base of the occipital process. Dorsal spine striate on the sides, with weak retrorse teeth near its tip on the anterior margin; posterior margin with a few similar hooks near the tip; spine about equal to the head in length, the last ray two-fifths the length of the spine. Base of dorsal slightly greater than its distance from the adipose, which is slightly longer than the dorsal; its height 2.5 in its length. Upper caudal lobe two-fifths longer than the lower; anal emarginate; pectoral spine striate above and below, its outer margin nearly smooth in the adult, retrorse spines along its inner margin. Humeral process broad, obliquely truncate behind, not spine-like.

The following varieties were collected.

A.

One specimen, 98 mm. (maxillary barbel 115). Koriabo Rubber Plantation. (C. M. Cat. No. 1617.)

One specimen, about 127 mm. (maxillary barbel 150). Issorora Rubber Plantation. (I. U. Cat. No. 12009.)

Ten specimens, 53–68 mm. Creek in Mora Passage. (C. M. Cat. No. 1683 *a–d*; I. U. Cat. No. 12059.)

One specimen, 238 mm. (maxillary barbel 270). Lama Stop-Off. (C. M. Cat. No. 1608.)

Here belongs also the *macronema* of Bleeker.

Maxillary barbel extending beyond tip of caudal; vomerine teeth present; upper caudal rays 2.5 in the length; eye 1–1.4 in the interorbital.

Ashy, lateral line light; no spots.

B.

Four specimens, 115–253 mm. (maxillary barbel 133–238). Wismar. (C. M. Cat. No. 1609; I. U. Cat. No. 12010.)

Three specimens, about 67–108 mm. (maxillary barbel 138). Locality? (C. M. Cat. No. 1610; I. U. Cat. No. 12011.)

114 specimens, 50–173 mm. Bartica Sand-bank. (C. M. Cat. No. 1611*a–i*; I. U. Cat. No. 12012.)

Two specimens, 92 (maxillary barbel 100) to about 96 mm. (maxillary barbel 100). Rockstone. (C. M. Cat. No. 1612; I. U. Cat. No. 12013.)

Two specimens, 89–93 mm. (maxillary barbel 110–115). Crab Falls. (C. M. Cat. No. 1613; I. U. Cat. No. 12014.)

Two specimens, 111 mm. to base of lower caudal lobe. Rupununi. (C. M. Cat. No. 1614; I. U. Cat. No. 10215.)

Vomerine teeth present; upper caudal lobe 2.66 in the length; eye greater than interorbital to 1.5 in interorbital; color in young ashy to below the lateral line, lateral line and a narrower line half-way between it and the back light, the dark streak below the lateral line breaking into spots at times, the light line on the upper part of the sides becoming irregular; a dark predorsal spot; a darker streak along humeral spine to above the ventral; dorsals spotted; color especially bright in Nos. 1614 C. M. Cat. and 12015 I. U. Cat.; color of adult uniform ashy, without spots.

A single small specimen, 50 mm. long, from Tumatumari, probably belongs here.

Two specimens, 275 (maxillary barbel 171, not reaching to caudal)–330 mm. (maxillary barbel 235, reaching to caudal). Botanic Gardens. (C. M. Cat. No. 1615; I. U. Cat. No. 12016.)

Five specimens, 190–172 mm. Lama Stop-Off. (C. M. Cat. No. 1616; I. U. Cat. No. 12017.)

Steel-blue, with light reticulations breaking the blue into small spots; lateral line white.

Maxillary barbel usually not reaching the caudal. Eye 1.5 in interorbital.

48. Pimelodus ornatus Kner.

Pimelodus ornatus Kner, SB. Akad. Wiss. Wien, XXVI, 1857, 411, fig. 18 (Surinam; Rio Negro; Cujabá).—Günther, Catalogue, V, 1864, 116 (River Capin, Pará).—Peters, MB. Akad. Wiss. Berlin, 1877, 470 (Calabozo).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 134 (Goyaz).—Eigenmann and Kennedy, Proc. Acad. Nat. Sci. Phila., 1903, 499 (Asuncion; Arroyo Trementina).—Eigenmann, Ann. Carnegie Mus., IV, 1907, 115 (Corumbá); Repts. Princeton Univ. Exp. Patagonia, III, 1910, 388.

Pseudorhamdia ornata Bleeker, "Silures de Suriname," 1864, 77 (Surinam).

Silurus megacephalus (*ex* Natterer, MS.) Kner, SB. Akad. Wiss. Wien, XXVI, 1857, 413.

Five specimens, 140–283 mm. Creek below Potaro Landing. (C. M. Cat. No. 1618*a* and *b*; I. U. Cat. No. 12018.)

Twenty-six specimens, 45–167 mm. Tumatumari. (C. M. Cat. No. 1619*a*–*e*; I. U. Cat. No. 12019.)

Three specimens, 114–144 mm. Rockstone. (C. M. Cat. No. 1620; I. U. Cat. No. 12020.)

One specimen, 55 mm. Crab Falls. (C. M. Cat. No. 1621.)

Head 3.3–3.5; depth 4.4–5.5; D. I,6; A. 12–13.

Profile nearly straight, interorbital slightly depressed; surfaces of head covered, scarcely granular in the adult. Dorsal spine slender, smooth or slightly rough in front, not quite equal to snout and eye; last dorsal ray about half the length of the highest, the spine not reaching beyond the middle of the last ray when depressed, usually shorter; base of dorsal a little greater than its distance from the adipose, which is longer than the dorsal; caudal lobes slender, the upper 3.5–4 in the length; posterior margin of anal subtruncate; pectoral spine about equal to the snout, with antrorse teeth in front and retrorse teeth behind. Maxillary barbel reaching to base or to tip of caudal, post-mental to middle of pectoral; no teeth on the vomer; humeral process spine-like. Dorsal with a conspicuous black blotch near the middle of the front half of the fin; a light streak from dorsal spine to above ventral and then back to the middle caudal rays, and above this again another light streak.

49. **Pimelodus heteropleurus** sp. nov. (Plate XVI, fig. 2.)

Type unique, 46 mm. Rupununi Pan. (Carnegie Museum Catalog of Fishes No. 1734.)

Head 4; depth 5.3; D. I,6; A. 11; adipose 4 in the length; eye 3.3 in the length, but little shorter than the snout, one-fourth longer than width of interorbital.

Form of *Pimelodus clarias*, the occipital process narrow at its base, scarcely tapering to its tip, which just reaches the dorsal plate; fontanel not quite reaching to the posterior margin of the eye, a bridge over the middle of the eye, the part back of it narrower, not continued as a groove; jaws equal, the teeth in bands of equal width in the two jaws; maxillary barbels reaching a little beyond middle of adipose, outer mental barbel just beyond base of pectoral.

Dorsal spine slender, equal to head without snout in length, about equal to the distance between the dorsals; anal rounded; ventrals not reaching anal; pectoral spine a little longer than the dorsal spine, rough in front, with retrorse teeth behind which increase in size to the middle of the spine, where they cease abruptly; humeral process spine-like.

Sides punctate, the chromatophores in the median area between the dorsal and anal gathered along the septa; a median series of chromatophores along the sides; back along base of dorsal and between the dorsals dark.

50. **Pimelodus altipinnis** Steindachner.

Pimelodus altipinnis Steindachner, "Ichthyologische Notizen," i, 1864, 14, pl. 2, figs. 3 and 4 (Demerara); "Ichthyologische Beiträge," iv, 1876, 55, pl. 11 (Pará; Santarem; Cameta).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 135 (Pará); Occasional Papers Cal. Acad. Sci., I, 1890, 180 (Pará).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 388.—?Perugia, Ann. Mus. Genova, (2), XVIII, 1897, 18 (Rio Beni).—Eigenmann and Bean, Proc. U. S. Nat. Mus., XXXI, 1907, 660 (Amazon).

The type of this species came from Demerara. It is 86 mm. long. No specimens were secured by me. The species has the general characters of a *Pimelodella*, and it would not be surprising if the small type in the Vienna Museum should prove to be a *Pimelodella* and distinct from the specimens subsequently referred to the same name.

Gœldiella Eigenmann and Norris.

Gœldiella Eigenmann and Norris, Rev. Mus. Paulista, IV, 1900, 353 (*eques*). Type, *Pimelodus eques* Müller and Troschel.

This genus differs from the related genera *Pimelodus* and *Pimelodella* in the character of the caudal fin, which is unequally lobed.

51. **Gœldiella eques** (Müller and Troschel).

Pimelodus eques Müller and Troschel, in Schomburgk, Reisen, III, 1848, 628 (all rivers of Guiana); Horæ Ichth., III, 1849, 5 (Guiana).—Günther, Catalogue, V, 1864, 116 (copied).—Steindachner, "Ichthyologische Beiträge," v, 1876, 99 (Amazon near Fonteboa; Teffé; Obidos; Villa Bella; José Fernandez; Xingu; Tonantins; Hyutahy; Lake Hyanuary).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), 1888, 134 (localities given by Steindachner); Occasional Papers Cal. Acad. Sci., I, 1890, 166; Proc. U. S. Nat. Mus., XIV, 1891, 29.—Pellegrin, Bull. Mus. d'Hist. Nat., V, 1899, 405 (Manaos).

Gœldiella eques Eigenmann and Norris, Rev. Mus. Paulista, IV, 1900, 353.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 388.

Eleven specimens, 91–148 mm. Rupununi. (C. M. Cat. No. 1606*a–c*; I. U. Cat. No. 12008.)

One specimen, 205 mm. Rockstone. (C. M. Cat. No. 1607.)

Head 3.5–3.75; depth 4.75–5.25; D. I,6; A. 10 or 11.

Profile in front of dorsal nearly straight, lower outline nearly straight from caudal to below eye; interorbital flat; bones of the head from the nares to the dorsal plate and the dorsal plate with reticulated ridges; occipital fontanel a narrow slit in specimens up to a length of at least 150 mm.

Eye 4.5–5.5, 1.3–1.5 in interorbital, somewhat behind the middle of the head; premaxillary teeth in a narrow band of the same width throughout. Maxillary barbel extending to the middle of the caudal or farther, post-mental not quite to tip of pectoral.

Dorsal spine with retrorse notches in front, roughened behind, about equal to snout and eye in length; pectoral spine strong, striate above and below, with antrorse teeth in front and retrorse teeth behind; adipose fin nearly or quite half as long as the body without the head; caudal peduncle half as high as long. Caudal slightly notched, the upper lobe shorter than the lower, projecting for about one-fourth of its length beyond the fork.

A dark saddle downward and forward from front of dorsal, covering nearly the entire opercle; an irregular mottled dark band along the lateral line and just below it; base of caudal dark, the fins irregularly mottled. Lower surface white.

Phractocephalus Agassiz.

Phractocephalus Agassiz, Selecta Gen. et Spec. Pisc. Bras., 1829, 22 (*bicolor* = *hemilopterus*).

Large. Vomer with a large pentagonal patch of teeth in contact with the palatine patches. Occipital process large, semicircular, not meeting the reniform dorsal plate. Upper half of adipose usually rayed. Barbels subterete. Caudal forked; head as broad as long.

Type, *Silurus hemiliopterus* Bloch and Schneider.

52. **Phractocephalus hemiliopterus** (Bloch and Schneider).

Silurus hemiliopterus Bloch and Schneider, Syst. Ichth., 1801, 385.

Phractocephalus hemiliopterus Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 3, pl. 421.—Schomburgk, Fishes Brit. Guiana, I, 1841, 169 (Guiana, everywhere).—Müller and Troschel, in Schomburgk, Reisen, III, 1849, 643 (all rivers of Guiana).—Castelnau, Anim. Am. Sud, Poiss., 1855, 47, pl. 15, fig. 4 (Rio Crixas; Araguay; Amazon).—Günther, Catalogue, V, 1864, 110 (River Cupai).—Vaillant, Bull. Soc. Philom., (7), IV, 1880, 152 (Calderon).—Cope, Proc. Am. Philos. Soc., XVII, 1878, 674 (Peruvian Amazons).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 135 (Xingu; Coary; Teffé; Manacapuru; Obidos; Lake Hyanuary); Occasional Papers Cal. Acad. Sci., I, 1890, 188.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 390.

Phractocephalus bicolor Agassiz, Selecta Gen. et Spec. Pisc. Bras., 1829, 23 (Amazon).

Pirarara bicolor Spix, Gen. Spec. Pisc. Bras., 1829, 23 (Amazon).

No specimens of this species were preserved. Parts of a head were seen in the Georgetown market. Schomburgk states that it reaches a length of four feet and is "common to all rivers." The description is taken from Eigenmann and Eigenmann.

Head 3.33; depth 4.75; Br. 9; D. I,7; A. 9; eye 9 in head, 3 in snout, 5 in interorbital, 2 diameters behind the rictus.

Body rapidly tapering towards caudal; head heavy, broad, flattened between the eyes; greatest width of the head equals its length; width at the angle of the mouth 2 in its length.

Maxillary barbel on edge of lip, opposite anterior nostril, reaching beyond the tips of the pectoral fin; mental barbels two-thirds to one-half as long as postmental barbels, which reach the pectoral. Lower jaw included; teeth all alike, those on the intermaxillaries in a broad band of equal depth throughout; vomerine teeth in a much broader patch; palatine teeth in narrower, wedge-shaped patches contiguous to the vomerine patch. Gill-membranes separate to below anterior margin of the eye. Gill-rakers short and fleshy, 4 + 15. Bones behind eye variously grooved and granulated; the occipital process broadly rounded behind, not meeting the reniform dorsal plate.

Dorsal spine midway between snout and tip of adipose dorsal, and between bases of pectoral and ventral fins; last dorsal ray over base of ventral, the length of the spine 2.25 in head.

Adipose dorsal short, high, its upper portion generally transformed into true rays; its base longer than that of the anal.

Caudal broad, slightly emarginate. The rays of the dorsal and caudal thick and terete, once or twice branched. Ventrals extending for half their length beyond the vent.

Pectoral spine two or three times as thick as the dorsal spine, broad lamellæ in front and sharp recurved teeth behind; its length 2 in the head.

Between pectorals and anal dark brown; lower part of head, a narrow band above pectorals and along sides, spreading over the lower three-fourths of the tail, white (yellow in life), region above this brownish; a round white spot on each side of dorsal spine; orbit bordered with white above, head and ante-dorsal region with darker spots or vermiculations; sometimes all of the lower parts are white.

Brachyplatystoma Bleeker.

Platystoma Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, — (sp.).
Brachyplatystoma Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 97 (*vaillanti*).

Piratinga Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 100 (*reticulata*).

Malacobagrus Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 100 (*filamentosus*).

Type, *Platystoma vaillanti* Cuvier and Valenciennes.

Vomer and palate with villiform teeth; inner teeth of the jaws slender and freely movable; caudal forked; head covered with skin; occipital process short, concealed, not reaching the dorsal in the adult.

53. **Brachyplatystoma vaillanti** (Cuvier and Valenciennes). (Plate XVII, fig. 3.)

"Laulau."

Platystoma vaillanti Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 21, pl. 423 (Cayenne and Surinam).—Kner, SB. Akad. Wiss. Wien, XXVI, 1857, 397 (Pará).—Günther, Catalogue, V, 1864, 108 (Demerara).—Peters, MB. Akad. Wiss. Berlin, 1877, 469 (Calabozo).

Brachyplatystoma vaillanti Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 97 (name only); "Silures de Suriname," 1864, 70 (Surinam).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 136 (Tabatinga; Pará; Porto do Moz; Arary; Rio Puty; Juiz de Fora); Occasional Papers Cal. Acad. Sci., I, 1890, 196.—Eigenmann and Bean, Proc. U. S. Nat. Mus., XXXI, 1907, 662 (Amazon).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 390.

Platystoma affine Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 24 (Brazil).—Castelnau, Anim. Am. Sud, Poiss., 1855, 40 (Araguay).—Günther, Catalogue, V, 1864, 109 (copied).

I have examined the specimen mentioned by Bleeker and:

One specimen, head only. Rockstone. (C. M. Cat. No. 1288.)

Sixteen specimens, 178–290 mm. to tip of middle caudal rays. Georgetown market. (C. M. Cat. No. 170*a–d*; I. U. Cat. No. 12083.)

Head 3.4–3.5; depth 5.5; D. I,6; A. 13; eye 4 in snout; 10 in head, 2.5 in interorbital in a specimen 290 mm. long to tip of middle caudal rays, 4 in snout, 9 in head, and 2.5 in interorbital in a specimen 178 mm. long to tip of middle caudal rays; adipose fin 4.4–4.5 in the length.

Subtriangular in section at the dorsal fin, the snout much depressed, the tail moderately compressed; occipital crest narrow, not much tapering, its width near the middle one-fourth its length in the Georgetown specimens, reaching but not joining the dorsal plate. An elongate depression along middle of the head; fontanel narrow, extending to the posterior margin of the eye; mouth lunate from below, the upper jaw scarcely projecting ; maxillary barbel extending beyond tip of middle caudal rays in all the Georgetown specimens; mental barbels opposite angle of

mouth, the post-mentals reaching beyond the ventrals. Dorsal and anal emarginate, the first ray in each reaching beyond the tip of the last; dorsal and pectoral spines slender, with recurved hooks on the posterior margin, most marked toward the tip; pectoral and ventral falcate; caudal deeply forked, the outer rays normally about 4 times as long as the middle ones, but prolonged in the young to equal the length from snout to caudal.

Pale below, darker above.

The young of this species can be readily distinguished by its long barbels and prolonged caudal tips.

HEMISORUBIM Bleeker.

Platystoma CUVIER and VALENCIENNES, Hist. Nat. Poiss., XV, 1840, 27 (sp.), preoccupied in Diptera.

Hemisorubim BLEEKER, Nederl. Tijdschr. Dierk., I, 1863, 97 (*platyrhynchos*).

Type, *Platystoma platyrhynchos* Cuvier and Valenciennes.

Upper jaw thin and truncate, shorter than the lower jaw; snout narrowed; the width at the angle of the mouth 1.5 times in the greatest width of the head; mental barbels approximate and near the edge of the lip; premaxillary band of teeth much shallower at the middle than at the ends; the palatine patches large. Occipital process shorter than the dorsal plate and meeting it; postorbital portion of the head striate and granulate; skin on the sides of the head and snout reticulate.

54. **Hemisorubim platyrhynchos** Cuvier and Valenciennes.

Platystoma platyrhynchos CUVIER and VALENCIENNES, Hist. Nat. Poiss., XV, 1840, 27 (no locality).—MÜLLER and TROSCHEL, in Schomburgk, Reisen, III, 1848, 628 (Rupununi).—CASTELNAU, Anim. Am. Sud, Poiss., 1865, 40 (Amazon).—KNER, SB. Akad. Wiss. Wien, XXVI, 1857, 398 (Barra do Rio Negro).

Hemisorubim platyrhynchos BLEEKER, Nederl. Tijdschr. Dierk., I, 1863, 97 (name only).—EIGENMANN and EIGENMANN, Proc. Cal. Acad. Sci., (2), I, 1888, 138 (Manacapuru; Rio Negro; Montalegre; Rio Puty; Lago Alexo; Obidos; Coary; Tabatinga; Hyavary; Tonantins; São Paolo); Occasional Papers Cal. Acad. Sci., I, 1890, 206.—EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 390.

Hemisorubim platyrhynchus GÜNTHER, Catalogue, V, 1864, 109 (copied).—PETERS, MB. Akad. Wiss. Berlin, 1877, 470 (Calabozo).—COPE, Proc. Am. Philos. Soc., XVII, 1878, 674 (Peruvian Amazon).—VAILLANT, Bull. Soc. Philom., (7), IV, 1880, 152 (Calderon).

No specimens of this species were obtained.

I have been able to examine a specimen collected by Schomburgk and now in the Berlin Museum.

Head 3; depth 6–7; D. I,6; A. 10; Br. 11; eye 7 in head, 3 in snout, 1.75 in interorbital.

Head depressed, rounded on occiput; eye directed largely upward. Lower jaw projecting and entering profile. Maxillary barbels extending past dorsal fin; mental barbels approximate, extending to below eyes; post-mentals to pectorals. Teeth in the lower jaw in a narrow band. Vomerine and palatine teeth close behind the premaxillary teeth, the vomerine teeth in a single patch separate from the palatine patches.

Dorsal spine weak and slender, 2.5 in head, its distance from the snout greater than its distance from the posterior margin of the adipose fin, much nearer base of ventrals than base of pectorals; with retrorse teeth behind. Adipose fin longer than anal. Lower caudal lobe wider and longer than upper, rounded in adult, pointed in young. Ventrals extending two-fifths their length beyond the vent. Pectoral spine 1.6 in head, usually with equally strong teeth in front and behind.

White below, olivaceous above, with a few jet-black spots scattered on sides, and usually a similar spot at base of upper caudal lobe; fins plain.

Pseudoplatystoma Agassiz.

Platystoma Agassiz, Selecta Gen. et Spec. Pisc. Bras., 1829, 23 (sp.).
Sorubim Spix, Selecta Gen. et Spec. Pisc. Bras., 1829, pls. 12–15 (sp.).
Pseudoplatystoma Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 97 (*fasciatum*).
Hemiplatystoma Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 97 (*tigrinum*).

Type, *Silurus fasciatus* Linnæus (in part).

Upper jaw little longer than lower; teeth of the jaws alike; vomerine and palatine patches of teeth more or less united, the two forming a comma-shaped patch on each side of the palate; gill-rakers short, spine-like, not overlapping; caudal deeply lobed, the lobes rounded (except in very young), the rays very much branched, giving the fin a leathery texture. Branchiostegals 14 or 15; barbels short.

55. Pseudoplatystoma fasciatum (Linnæus).

Tiger-fish.

Silurus fasciatus Linnæus, Syst. Nat., ed. 12, I, 1766, 505.—Gmelin, Syst. Nat., I, iii, 1788, 1359.—Bonnaterre, Tabl. Enc. Meth., Ichth., 1788, 154, 252.—Bloch, Ausl. Fische, VIII, 17?4, 30, pl. 366.—Bloch and Schneider, Syst. Ichth., 1801, 382.

Pimelodus fasciatum Lacépède, Hist. Nat. Poiss., V, 1803, 94, 99, 100.

Platystoma fasciatum Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 14 (copied).—Kner, SB. Akad. Wiss. Wien, XXVI, 1857, 401 (Surinam).—Günther, Catalogue, V, 1864, 107 (Essequibo; Surinam; River Capin, Pará).—Peters, MB. Akad. Wiss. Berlin, 1877, 469 (Calabozo).—Steindachner, "Fisch-Fauna Magdalenen-Stromes," 1878, 15 (Magdalena River).—Cope, Proc. Am. Philos. Soc., XVII, 1878, 674 (Peruvian Amazon).—Steindachner, "Fisch-Fauna des Cauca," etc., 1880, 5 (Cauca); "Ichthyologische Beiträge," viii, 54 (Surinam); "Flussfische Südamerika's," iv, 1882, 4 (Rio Amazonas; Iquitos).

Pseudoplatystoma fasciatum Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 97 (name only); "Silures de Suriname," 1864, 72 (Surinam).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 138 (Obidos; Coary; Hyavary); Occasional Papers Cal. Acad. Sci., I, 1890, 208.—Steindachner and von Bayern, Denkschr. Akad. Wiss. Wien, LXXII, 1902, 136 (Rio Lebrija, Colombia).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 39.

Platystoma truncatum Agassiz, Selecta Gen. et Spec. Pisc. Bras., 1829, 27, pl. 13*a* (Rio Japura and Solimoens).—Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 20 (Brazil).—Hyrtl, Denkschr. Akad. Wiss. Wien, XVI, 1859, 17 (vertebræ 13 + 33).—Günther, Catalogue, V, 1864, 108 (copied).

Platystoma tigrinum (not of Cuvier and Valenciennes) Schomburgk, Fishes Brit. Guiana, I, 1841, 185 (most of the rivers).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 627 (nearly all rivers).

Platystoma punctifer Castelnau, Anim. Am. Sud, Poiss., 1855, 40, pl. 19, fig. 2 (Amazon).

Four specimens, 245–295 mm. Rupununi Pan. (C. M. Cat. No. 1699*a*; I. U. Cat. No. 12082.)

One specimen, 455 mm. Wismar. (C. M. Cat. No. 1295.)

Head 2.66–2.75; depth 6.5–7.25; D. I,6; A.11–14; eye 6 in snout, 12 in head, 2.5 in interorbital.

Snout much depressed; body slender, subterete at the dorsal; groove of the fontanel not continued to the occipital process; a deep groove across the head at base of the occipital process; maxillary barbel reaching to near tip of dorsal. Dorsal spine nearer tip of adipose than to tip of snout.

Dark brown above, abruptly white on the lower part of the sides; about ten black cross-bands, margined with white in front; some dark spots along the line of

the lower ends of the bars; vertical fins, and sometimes tips of ventrals, spotted. The specimen in the Leiden museum mentioned by Bleeker agrees with the above.

Subfamily Doradinæ.

Doras Lacépède.[17]

Doras Lacépède, Hist. Nat. Poiss., V, 1803, 116 (*carinatus* and *costatus*)—Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 267 (*costatus*).

Centrochir Agassiz, Selecta Gen. et Spec. Pisc. Bras., 1829, 14 (*crocodili*).

Lithodoras Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 84 (*lithogaster*).

Pterodoras Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 84 (*granulosus*).

Platydoras Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 86 (*costatus*) = *Doras* Cuvier and Valenciennes.

Acanthodoras Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 86 (*cataphractus*).

Astrodoras Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 86 (*asterifrons*).

Amblydoras Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 86 (*affinis*).

Zathorax Cope, Proc. Acad. Nat. Sci. Phila., 1872, 271 (*monitor*) = *Astrodoras* Bleeker.

Agamyxis Cope, Proc. Amer. Philos. Soc., XVII, 1878, 101 (*pectinifrons*).

Type, *Silurus costatus* Linnæus.

Doradines with anterior nares on or near the upper lip; the snout short, the eye in anterior half of the head; teeth well-developed; adipose fin usually with a well-defined anterior margin.

Key to the Species of Doras.

a. Caudal forked; dorsal spine serrate in front and behind, the serræ of the anterior margin antrorse. Sides of dorsal spine with striations (*Doras*).

b. Plates of the sides increasing in height to the caudal peduncle, the highest about .4 the height of the peduncle; caudal peduncle naked above and below, spotted, without lateral bands. **granulosus.**

bb. Plates of sides decreasing in height regularly from the dorsal to the caudal, not meeting along a median line above or below; caudal peduncle with a series of plates above and below. Slate-colored above, with a yellow band from the fontanel along the sides to the tip of the middle caudal rays; ventral surface without ossifications. . . . . **costatus.**

aa. Caudal very slightly emarginate or rounded; dorsal spine without serrations either in front or behind, the sides of the spine with smooth striations; plates of the sides decreasing in height from the dorsal to the caudal, not meeting above and below; caudal peduncle largely naked above and below, the caudal fulera continued about half-way to adipose and anal fins; chocolate brown with an irregular dark band below the median hooks of the lateral plates, and other darker blotches; nuchal region roof-shaped. (*Amblydoras*) . . . . . **hancocki.**

[17] *Doras maculatus* Valenciennes, Müller and Troschel, in Schomburgk, *Reisen*, III, 1848, 629 (Essequibo).

aaa. Caudal rounded; dorsal spine with a series of straight teeth along its anterior margin, its sides with a regular or several irregular (in old), series of straight teeth, its posterior margin without teeth; plates of sides of about the same height from dorsal to anal, those of opposite sides meeting along the median line on upper and lower surfaces of the caudal peduncle of the adult; a narrow light line from the upper margin of the eye to the caudal; a light line from dorsal spine forward to the fontanel; nuchal region broadly rounded. (*Acanthodoras*) ..... cataphractus.

56. Doras granulosus Valenciennes. (Plate XVII, fig. 4.)

Doras granulosus Valenciennes, in Humboldt, Rec. Obs. Zool., II, 1811, 184.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 392.

Pterodoras granulosus Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 15 (name only) "Silures de Suriname," 1864, 36 (Surinam).

Doras maculatus Valenciennes, in d'Orbigny, Voy. Am. Mer., V, ii, 1847, 7, pl. 5, fig. 3.—Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 281 (Buenos Ayres).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 629.—Steindachner, Denkschr. Akad. Wiss. Wien, XLI, 1879, 47 (Rio de la Plata).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 150 (Arary?); Occasional Papers Cal. Acad. Sci., I, 1890, 229 (Arary?; Uruguay; Buenos Aires, Serfa).

Doras murica (*ex* Natterer, MS.) Kner, SB. Akad. Wiss. Wien, XVII, 1885, 129 (Cujabá).

Doras muricus Günther, Catalogue, V, 1864, 202 (Demerara?).

No specimens were secured. I have examined a specimen about 395 mm. long collected by Schomburgk in Guiana.

Head 4, depth about 4; D. I,6; A. 11; plates 35; eye 3.5 in the snout, 10 in the head, 3.5 in the interorbital.

Lateral plates beginning on the vertical from just in front of the dorsal, the twelfth about equal to the eye in height, the highest on the caudal peduncle .4 the height of the peduncle, with a median but no lateral spines. Dorsal spine nearly as long as the head, the spines of the posterior margin much longer than those of the anterior; pectoral spine longer than the head, its posterior spines about twice as long as its anterior; caudal forked, the lower lobe longer. Humeral spine very slender, reaching to below the dorsal spine. Maxillary barbel reaching to the tip of the pectoral; free margin of the nasal plate but little pectinate.

Chocolate, marbled; the fins spotted.

57. Doras costatus (Linnæus).

Silurus costatus Linnæus, Syst. Nat., ed. 12, I, 1766, 506.

Cataphractus costatus Bloch, Ausl. Fische, VIII, 1794, 82, pl. 376.

Doras costatus Lacépède, Hist. Nat. Poiss., V, 1803, 116, part (South America).—Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 268 (Guiana).—Castelnau, Anim. Am. Sud, Poiss., 1855, 48 (Amazon).—Günther, Catalogue, V, 1864, 201 (British Guiana; River Cupai).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 161 (Rio Preto; Rio Puty; San Gonçallo; Xingu Cascade; Obidos; Gurupa; Teffé); Occasional Papers Cal. Acad. Sci., I, 1890, 231.—Perugia, Ann. Mus. Genova, (2), 1891, 34 (Villa Maria, Paraguay).—Kindle, Ann. N. Y. Acad. Sci., VIII, 1895, 251 (Trocera on the Tocantins).—Eigenmann and Kennedy, Proc. Acad. Nat. Sci. Phila., 1903, 500 (Paraguay).—Eigenmann, Ann. Carnegie Mus., XXXI, 1907, 116 (Corumbá; Laguna Ipacarai); Repts. Princeton Univ. Exp. Patagonia, III, 1910, 393.

Platydoras costatus Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 16 (name only); "Silures de Suriname," 1864, 38 (Surinam).

Doras cataphractus (not of Linnæus) Schomburgk, Fishes Brit. Guiana, I, 1841, 158 (Rio Negro).

Doras armatulus Müller and Troschel, in Schomburgk, Reisen, III, 1848, 629 (Rupununi; Awaricura).

Two specimens, 105 and 108 mm. Twoca Pan. (C. M. Cat. No. 1638; I. U. Cat. No. 12030.)

Four specimens, 75–90 mm. Gluck Island. (C. M. Cat. No. 1639; I. U. Cat. No. 12031.)

One specimen in the Berlin Museum from Guiana and two from Calabozo.

Head 3.75; depth 4.25; D. I,6; A. 11; lateral plates 2 + 30 or 31. Eye 1.66–2 in snout, 4–5 in head; 1.5–2 in interorbital. Ventral surfaces of coracoid not exposed. Width at tip of humeral processes greater than the depth; nuchal region bluntly roof-shaped. Head granular to in front of posterior nares; nasal bone with blunt serration, scarcely raised; orbit with granular margin; maxillary barbel reaching to tip of humeral process, outer mental to base of pectoral.[18] Upper jaw longer; width of mouth less than half the distance between the gill-openings. Pectoral spine striate above and below, strongly serrate in front and behind, reaching beyond base of ventrals; dorsal spine shorter than pectoral spine, its sides striate, serrate on its anterior and posterior margin, the serræ on the posterior margin much smaller; teeth on front margin of dorsal spine antrorse; largest near the tip; humeral process reaching to fourth fifth of the pectoral spine; caudal forked; height of highest lateral plate about half the length of the head, each plate with numerous small backward-directed spines, in several vertical rows in front,

[18] To its middle in the larger specimen at Berlin.

in a marginal row behind; median spines strong, recurved; caudal peduncle entirely covered with a median series of plates above and half-way to the anal below.

Slaty blue, a light band from the fontanel along the middle to the tip of the caudal; lower surface and margin of head to near the eye light. Barbels dark, dark streak back from the maxillary barbel; dorsal with a dark band across its upper part; center and margins of caudal light, a pair of submarginal dark bands; anal with a dark streak; ventrals hyaline; pectoral dusky.

58. **Doras hancocki** Cuvier and Valenciennes.

"Saurauwari," "Yarauira."

Doras costata (not of Linnæus) Hancock, Zool. Journ., IV, 1828, 242 (Demerara).—Schomburgk, Fishes Brit. Guiana, I, 1841, 156.

Doras hancockii Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 279.—Günther, Catalogue, V, 1864, 202 (Demerara; Rio Cupai).—Eigenmann and Eigenmann, Occasional Papers Cal. Acad. Sci., I, 1890, 234.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 393.

One hundred and ninety-five specimens, 9–120 mm. Lama Stop-Off. (C. M. Cat. No. 1443*a–i*; I. U. Cat. No. 12033.)

Ten specimens, 65–123 mm. Maduni Creek. (C. M. Cat. No. 1444*a–b*; I. U. Cat. No. 12034.)

One specimen, 28 mm. Wismar. (C. M. Cat. No. 1445*a*).

Nine specimens, 26–41 mm. Rockstone. (C. M. Cat. No. 1446*a–b*; I. U. Cat. No. 12035.)

Twelve specimens, 28–36 mm. Gluck Island. (C. M. Cat. No. 1649*a–b*; I. U. Cat. No. 12038.)

Four specimens, 68–98 mm. Tumatumari. (C. M. Cat. No. 1447*a*; I. U. Cat. No. 12036.)

Eight specimens, 30–45 mm. Rupununi Pan. (C. M. Cat. No. 1448*a–b*; I. U. Cat. No. 12037.)

Head 4–4.3; depth 4.25; width at tip of humeral process 3.66; D. I,6; A. 11–13; lateral plates 1 + 25; eye 1.5 in snout, 4.5 in head. 1.5 in interorbital.

Coracoid and its process exposed below, striate; nuchal area with a blunt median keel, roof-shaped; head granular to the anterior nares; movable nasal bone large, forming part of the orbit; maxillary barbel reaching tip of humeral process, outer mental barbel to its middle; jaws equal, mouth terminal, its width less than half the space between the gill-openings.

Pectoral spine strongly serrate on its anterior and posterior margins, its upper

surface with three sharp ridges, its lower striate, reaching past base of ventrals; dorsal spine shorter than pectoral spine, with four sharp ridges on each side and a median one in front, the latter sometimes broken up into teeth near the base of the spine; caudal truncate, very slightly emarginate or rounded; humeral process with lines of granules, which become stronger along the lower margin, and recurved spines towards its tip.

Lateral plates regularly decreasing in height backward, each with a strong recurved hook, and ridges above and below which end in spines; caudal fulcra extending forward above and below on the caudal peduncle, but the latter largely naked.

Ash-colored; head and body variously marked with black; an irregular black band along sides below the median hooks. A black spot at base of caudal; three more or less distinct black blotches on the back; one down and behind dorsal, one about adipose and one across caudal peduncle; dorsal and caudal, and to less extent the remaining fins, marked with black; lower surface variously marked.

59. Doras cataphractus (Linnæus).

Silurus cataphractus Linnæus, Syst. Nat., ed. 10, I, 1758, 307; ed. 12, I, 1766, 506.

Doras cataphractus Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 276 (?).—Kner, SB. Akad. Wiss. Wien, XVII, 1855, 126 (Rio Guaporé; Barra do Rio Negro).—Bleeker, Ichth. Arch. Ind. Prodr., I, 1858, 54.—Günther, Catalogue, V, 1864, 204 (?).—Eigenmann and Eigenmann, Occasional Papers Cal. Acad. Sci., I, 1890, 234.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 393.

Acanthodoras cataphractus Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 17; "Silures de Suriname," 1864, 40 (Surinam).

Cataphractus americanus Bloch and Schneider, Syst. Ichth., 1801, 107, pl. 28.—Lacépède, Hist. Nat. Poiss., V, 1803, 124, 127 (Carolina ?).

Doras blochii Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 277 (copied).

? *Doras castaneo-ventris* Schomburgk, Fishes Brit. Guiana, I, 1841, 161, pl. 3 (Rio Pasawiri).

? *Doras brunnescens* Schomburgk, Fishes Brit. Guiana, I, 1841, 163 (Upper Essequibo).

Doras polyramma et polygramma (*ex* Heckel, MS.) Kner, SB. Akad. Wiss. Wien, XVII, 1855, 126, 127.

Callichthys asper Gronow, Cat. Fish., ed. Gray, 1854, 157.

One specimen, 170 mm. Kangaruma. (C. M. Cat. No. 1640.)

One specimen, 84 mm. Georgetown. (C. M. Cat. No. 1641.)

Twenty specimens, 53–112 mm. Gluck Island. (C. M. Cat. No. 1642*a–c*; I. U. Cat. No. 12032.)

Head 3.75–4; depth equals head; width 3.16; D. I,5; A. 10 or 11; lateral plates 2 or 3 + 22 to 27; eye 2.5 in snout, 9 in head, 3.5–4 in interorbital.

Ventral surfaces of coracoid not exposed; head depressed, flat between the eyes, becoming slightly arched in the nuchal region, not roof-shaped, granulated to between the anterior nares; posterior nares just in front of the supraorbital ridge, scarcely protected by the low nasal bone; orbital margin, preopercle and opercle granular in the adult; maxillary barbel reaching to second third of humeral process in the adult, beyond its tip in the young; outer mental barbels scarcely shorter than the maxillary. Jaws equal or the upper but slightly longer; mouth strictly terminal, its width less than half the distance between the gill-openings.

Pectoral spine strongly serrate on anterior and posterior margins; upper surface in young with a median series of straight teeth, in the adult with numerous irregularly placed teeth; lower surface rough in young, striate in adult; dorsal spine about two-thirds the length of the pectoral spine, its posterior surface smooth, its anterior surface with a series of straight spines, its sides with one or more series of similar spines; caudal rounded, humeral process reaching third fourth or fourth fifth of pectoral spine, with a series of large recurved spines in young, and smaller spines above them, the difference between large and small spines becoming less with age; lateral plates highest above origin of anal, those of opposite sides meeting along the median line from near the tip of the dorsal to the caudal and along the ventral line of the caudal peduncle; median spine of plates nearly straight, each plate from about the seventh with a series of teeth increasing in size toward the upper and lower margins; anterior plates with more numerous smaller spines.

Black; a light median line along back of head and sometimes body; a light line from posterior nares following margin of skull and then along median line of spines. Caudal black, with hyaline bars; other fins black with hyaline blotches or bands; posterior margin of adipose light; lower surface and sides of head marbled.

Oxydoras Kner.

Oxydoras Kner, SB. Akad. Wiss. Wien, XVII, 1855, 115 (sp.); Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 14 (*niger*).

Pseudodoras Bleeker, Ichth. Arch. Ind. Prodr., I, 1858, 53 (*niger*).

Rhinodoras Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 14 (*Orbignyi*).

Type, *Doras niger* Valenciennes.

Doradines with the barbels simple; no teeth; eye in posterior half of head, snout long and pointed.

60. **Oxydoras niger** (Valenciennes).

Doras niger Valenciennes, in Humboldt, Rec. Obs. Zool., II, 1811, 184.—Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 291 (?).—Schomburgk, Fishes Brit. Guiana, I, 1841, 165.—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 629 (Rivers of Guiana).—Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 14 (name only).

Rhinodoras niger Günther, Catalogue, V, 1864, 209 (Amazons).—Cope, Proc. Am. Philos. Soc., XVII, 1878, 678 (Nauta).—Vaillant, Bull. Soc. Philom., (7), IV, 1880, 14 (Calderon).

Oxydoras niger Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 159 (Teffé; Gurupa; Manacapuru; Coary; Obidos); Occasional Papers Cal. Acad. Sci., I, 1890, 247.—Kindle, Ann. N. Y. Acad. Sci., VIII, 1894, 251 (Pará).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 393.

Doras humboldti Agassiz, Selecta Gen. et Spec. Pisc. Bras., 1829, 129, pl. 5 (Rio San Francisco, Brazil).—Agassiz, a Journey in Brazil, 1868, —.

Corydoras edentatus Spix, Selecta Gen. et Spec. Pisc. Bras., 1829, pl. 5.

Rhinodoras prionomus Cope, Proc. Acad. Nat. Sci. Phila., 1874, 134 (Nauta); Proc. Am. Philos. Soc., XVII, 1878, 678 (Nauta).

Rhinodoras teffeanus Steindachner, SB. Akad. Wiss. Wien, LXXI, 1875, 145, pl. 3 (Teffé).

One specimen, 178 mm. Rupununi. (C. M. Cat. No. 1622.)

Head 3.3; depth 4.5; D. I,6; A. 11; lateral plates 23; eye 3 in interorbital, 4 in snout, 3 in preorbital part of head.

Deepest in front of dorsal spine, the depth equal to the width; caudal peduncle depressed, its depth half the distance from anal to lower caudal rays. Head pointed, its width 1.4 in its length, almost equal to its depth. Opercle, top of head, and dorsal plate tubercular striate. Interorbital flat; fontanel narrow, in a wide groove continued beyond the fontanel, which does not extend beyond the middle of the eye.

Lips and barbels thickly papillose, the barbels simple, free from the lips and not united; maxillary barbel extending a little beyond eye; distance between nares less than their distance from tip of snout or eye; distance between gill-openings equals width of mouth. Highest lateral scute less than one-fourth the length of the head, each scute with a very strong median hook, up to eight spines below the median hook and up to ten above it.

Dorsal spine striate, with a few straight spines on its posterior surface and much more numerous and stronger antrorse hooks on its anterior margin. Pectoral

spines with hooks of equal size in front and behind, the anterior antrorse, the posterior retrorse. Adipose fin low, gradually merging into the back in front. Caudal short and broad, its length equal to snout and eye.

Slaty black, with lighter markings below; fins black.

Leptodoras Boulenger.

Leptodoras Boulenger, Ann. and Mag. Nat. Hist., (7), II, 1898, 477.

Type, *Oxydoras acipenserinus* Günther.

No teeth; maxillary barbel fringed; anal 15–18; eye large.

Boulenger creates the genus *Leptodoras* on account of the longer body and the longer anal fin, 15–17 rays. In another place (*Trans. Zool. Soc.*, XIV, 1898, 423) he rejects the genus *Hemidoras* as indistinguishable from *Oxydoras*. As the type of *Hemidoras* has thirteen anal rays and *Hemidoras brevis* has thirteen or fourteen it might be doubted whether *Leptodoras* can be separated from *Hemidoras* on the score of anal rays. Since, however, *Leptodoras* has no teeth it may be kept distinct.

The extralimital species of this genus are *acipenserinus*, *juruensis* and probably *stübelii*. I have been able to examine the types of the two former in the British Museum.

Key to the Species of Leptodoras.

a. Dorsal spine short, pungent, serrate in front.

b. Eye 3.5 in the head; pectoral spine longer than snout and eye; reaching near middle of ventrals. **linnelli.**

(*bb*. Eye 5 in the head; pectoral spine longer, equal to snout and eye; reaching scarcely beyond origin of ventrals. **acipenserinus.**

aa. Dorsal spine prolonged, not pungent, roughened near its base; eye 6.5 in the head; pectoral spine reaching ventrals, head depressed **juruensis.**)

61. **Leptodoras linnelli** sp. nov. (Plate XVII, fig. 1; Plate XVIII, fig. 1.)

Leptodoras linnelli Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 395 (name only).

Type, 190 mm. Tumatumari. (Carnegie Museum Catalog of Fishes No. 1626.)

Cotypes, twenty-seven specimens, 64–209 mm. Tumatumari. (C. M. Cat. No. 1627*a–e*; I. U. Cat. No. 12022.)

Cotypes, two specimens, 64 and 182 mm. Rockstone. (C. M. Cat. No. 1628; I. U. Cat. No. 12024.)

Cotypes, six specimens, 75–103 mm. Crab Falls. (C. M. Cat. No. 1629*a*; I. U. Cat. No. 12023.)

Cotype, one specimen, 174 mm. Georgetown market? (C. M. Cat. No. 1630.)

Head 3.5; depth 6; D. I,6; A. 12–14; lateral plates 38–39; eye 3.5–4 in head, 1.75–1.8 in snout; interorbital 2 in eye.

Slender; depth equal to width; caudal peduncle broad, depressed, its depth equal to half its width, less than the distance of the anal from the caudal; fontanel continued as a groove to the tip of the occipital process. A small foramen on either side of the occipital process; no teeth; mouth nearly equal to the distance between the gill-openings. Maxillary barbel reaching gill-opening in the young, shorter in the adult.

Lateral plates well-developed along the entire sides, each with a central hook and a series of marginal spines, those above the median hook close-set; median hook strongest on the plates, just behind the vertical from the anal; humeral process short, its upper margin greatly arched.

Dorsal and pectoral spines of about equal length, little shorter than the head, the pectoral spine reaching to the middle of the ventrals or farther in the adult, not much beyond the base in the young; pectoral spine serrate on both edges, the teeth much stronger on the inner surface; dorsal spine with much feebler serrations; adipose free behind, its base nearly or quite equal to the base of the dorsal exclusive of the spine. A large pectoral pore.

White beneath, uniform dark above; a pair of parallel bands on the caudal, the middle rays light.

Hemidoras Bleeker.

Doras Lacépède, Hist. Nat. Poiss., V, 1803, 116 (*carinatus* and *costatus*).—Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 13 (*carinatus*), not *Doras* Cuvier and Valenciennes.

Oxydoras Kner, SB. Akad. Wiss. Wien, XXVII, 1855, 142 (sp.).

Hemidoras Bleeker, Ichth. Arch. Ind. Prodr., I, 1858, 53 (*stenopeltis*).

Hassar Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 158 (*orestes*).

Type, *Doras stenopeltis* Kner.

Barbels fringed; eye large. One or both jaws with teeth; numerous pectoral pores.

Key to the Guiana Species of Hemidoras.

a. No foramen on either side of juncture between occipital process and dorsal plate. (*Hemidoras*.)

b. Lateral plates of the anterior part of the body well-developed; teeth in the lower jaw small, in two patches.

c. Groove of the fontanel not extending backward; maxillary barbel not reaching gill-opening. Eye 2.75 in head (1 in young); teeth very feeble, mouth half as wide as distance between gill-openings. ..... **microstomus.**

cc. Maxillary barbel extending to base of pectoral; eye 4.5 in the head in the adult (3 in the young), 2.75 in the snout (1.5 in young); teeth well-developed in both jaws; snout pointed; mouth 1–1.5 in distance between gill-openings..... **carinatus.**

bb. Lateral plates of anterior part of body rudimentary or very small, increasing in size backward.

d. Teeth of the lower jaw minute, in two separate patches; differing from *carinatus* largely in the rudimentary anterior plates..... **micropœus.**

dd. Teeth of the lower jaw large, brown-tipped, in a single median patch; maxillary barbel extending beyond origin of pectorals; snout bluntly decurved; pectorals extending to ventrals; base of dorsal dark; a light band along the lateral hooks, bordered above and below by darker, which is most intense on base of caudal..... **leporhinus.**

aa. A large foramen on either side of the juncture between dorsal plate and occipital process; dorsal with a conspicuous black spot. (*Hassar.*)

c. Maxillary barbel extending to base of pectoral; orbit oval; snout long, conical; pectoral spine reaching ventrals; dorsal spine with hooks on the basal half of the anterior margin; humeral process elongate, its upper margin not greatly arched..... **notospilus.**

(*ee.* Maxillary barbel to below posterior part of the eye; orbit ovate with a narrowing forward extension; snout slender; origin of orbit behind the middle of the head; pectoral spine not reaching ventrals; dorsal spine with hooks along the basal two-thirds or three-fourths of its anterior margin; humeral process spatulate, its dorsal margin much curved.

f. Scapula covered with skin; dorsal spot not extending to tip of the membranes..... **orestes.**

ff. Scapula granular; black spot extending to upper margin of dorsal membranes..... **wilderi.**)

62. **Hemidoras microstomus** sp. nov. (Plate XVIII, fig. 2.)

Hemidoras microstomus EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 394 (name only).

Type, 52 mm. Rockstone. (Carnegie Museum Catalogue of Fishes No. 1650.)

Cotypes, twelve specimens, 35–51 mm. Crab Falls. (C. M. Cat. No. 1651 *a–b*; I. U. Cat. No. 12040.)

Cotype, one specimen, 52 mm. Rockstone. (I. U. Cat. No. 12039.)

Head 3.75–4.2; depth 4.33–5.5; D. I,6; A. 10–12; lateral plates 26–32; eye 2.5–2.66 in the head, 1–1.33 in the snout; interorbital 1–1.66 in eye.

Profile from dorsal to above eye straight, then descending rapidly; the snout very blunt, rounded; lower jaw much shorter, included; fontanel elliptical, little longer than eye, not continued as a groove; top of head convex. Width of mouth equal to half the distance between gill-openings. Teeth very feeble, if present. Maxillary barbels reaching gill-openings, or a little shorter; distance of dorsal spine from tip of snout 2.75–3 in the length.

Dorsal spine as long as the head or a little longer, with serræ on the basal half of the anterior margin and entire length of posterior margin. Pectoral spine a little longer or shorter than the dorsal spine, reaching the ventrals; base of adipose

less than diameter of eye. Lateral shields small, of uniform height, height 2.5–3.3 in eye, hooks highest above tip of anal fin. Humeral process four times as long as broad, spine-like.

Sides and back covered with minute black dots, thickest at base of dorsal and caudal fins, white underneath.

63. **Hemidoras carinatus** (Linnæus).

Silurus carinatus Linnæus, Syst. Nat., ed. 12, I, 1766, 504.—Bloch and Schneider, Syst. Ichth., 1801, 108.

Doras carinatus Lacépède, Hist. Nat. Poiss., V, 1803, 116 (Surinam).—Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 288, pl. 442 (Cayenne).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 629 (Essequibo).—Bleeker, Ichth. Arch. Ind. Prodr., I, 1858, 54; Nederl. Tijdschr. Dierk., I, 1863, 13 (name only); "Silures de Suriname," 1864, 31 (Surinam).

Doras (*Oxydoras*) *carinatus* Kner, SB. Akad. Wiss. Wien, XVII, 1855, 144 (Surinam).

Oxydoras carinatus Günther, Catalogue, V, 1864, 206 (Surinam; Essequibo River).—Vaillant, Bull. Soc. Philom. (7), IV, 1880, 154 (Calderon).

Hemidoras carinatus Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 158; Occasional Papers Cal. Acad. Sci., I, 1890, 258.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 394.

Doras oxyrhynchus Valenciennes, in Humboldt, Rec. Obs. Zool., II, 1833, 184.

One hundred and thirty-three specimens, 44–320 mm. Tumatumari. (C. M. Cat. No. 1631*a–z*; I. U. Cat. No. 12025.)

One specimen, 95 mm. Bartica. (C. M. Cat. No. 1632.)

Ninety-two specimens, 48–267 mm. Rockstone. (C. M. Cat. No. 1633*a–i*; I. U. Cat. No. 12026.)

Three specimens, 45, 113, and 247 mm. Georgetown market. (C. M. Cat. No. 1634*a*; I. U. Cat. No. 12027.)

One hundred and sixteen specimens, 39–140 mm. Crab Falls. (C. M. Cat. No. 1635*a–i*; I. U. Cat. No. 12028.)

Head 3.16–3.33; depth 4.25–4.5; D. I,6; A. 11–14; lateral plates 33; eye 3–4.5 in the head, 1.5–2.75 in the snout, the snout proportionately longer in the old individuals; interorbital 1.3–1.5 in the eye.

Heavy below the dorsal, the width 1.25 in the depth; caudal peduncle as wide as deep, its depth less than distance of anal from the lower caudal rays; occipital area roof-shaped, with a median groove which is not continued to the

fontanel; profile abruptly descending in front of the eye, the snout sharp; a pair of patches of small teeth in each jaw; those of the upper jaw sometimes wanting; mouth narrow, 1–1.5 in the distance between the gill-openings. Maxillary barbel reaching to the gill-openings.

Lateral plates nearly equally well-developed along the entire length; humeral process truncate, its upper and lower margins nearly parallel, its depth one-third of its length.

Distance between snout and dorsal 2.5 in the length, dorsal spine as long as snout and eye or shorter; pectoral spine longer than dorsal spine, reaching the ventrals; adipose fin low, its base equal to the base of the dorsal without the spine. Axillary pores numerous.

White below, ashy above, no definite markings. In the specimen from Bartica the dorsal spine is margined with dark.

64. **Hemidoras micropœus** sp. nov.

Hemidoras micropœus EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 394 (name only).

Type, 365 mm. Wismar. (Carnegie Museum Catalog of Fishes No. 1636.)

Cotype, 217 mm. Wismar.

Cotypes, two specimens, 250–270 mm. Lama Stop-Off. (C. M. Cat. No. 1637; I. U. Cat. No. 12029.)

These specimens differ from *carinatus* in having the plates from above the ventrals forward rudimentary.

65. **Hemidoras leporhinus** sp. nov. (Plate XIX, fig. 1.)

Hemidoras leporhinus EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 394 (name only).

Type, 56 mm. Tumatumari. (Carnegie Museum Catalog of Fishes No. 1624.)

Cotypes, three specimens, 53–59 mm. Crab Falls. (C. M. Cat. No. 1625; I. U. Cat. No. 12021.)

Readily distinguished by its peculiar leporine snout, and by its mouth, lower teeth, and coloration.

Head nearly 4; depth 5; D. 6; A. 12; lateral plates 33 to 35; eye 2.4 in the head, equal to the snout; interorbital 1.6 in the eye.

Depth equal to the width in front of the pectoral; caudal peduncle slender, its depth equal to the distance of the anal from the caudal fulcra; profile curved,

sharply so in front of the eye; snout pointed; fontanel continued as a groove to the tip of the dorsal plate; a small foramen on either side of the juncture between the dorsal plate and occipital process; mouth 2 in the distance between the gill-openings; five to seven teeth in each ramus of the lower jaw, grouped in front so as to form one continuous patch; maxillary barbel reaching at least to base of pectoral; humeral process more than three times as long as wide, rounded behind.

Lateral plates deepest above end of anal, their depth four-tenths of the length of the eye.

Distance of origin of dorsal from tip of snout 2.7 in the length.

Dorsal and pectoral spines about equal in length and equal to the length of the head.

Belly white; sides of head and body thickly dotted, darkest on dorsal surface of caudal peduncle; a light stripe along the lateral plates and middle caudal rays; bases of the caudal fulcra and a band above and below the central light band black; tip of upper lobe dusky; a dark area on base of dorsal, highest on the spine.

66. **Hemidoras notospilus** sp. nov. (Plate XIX, fig. 2.)

Hemidoras notospilus EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 394 (name only).

Type unique, 70 mm. Crab Falls. (Carnegie Museum Catalog of Fishes No. 1623.)

Head 3.33; depth 5; D. I,6; A. 12; lateral plates 33; eye 3 in head, 1.5 in snout; interorbital a little more than half the eye.

Profile from dorsal to above front of eye nearly straight, descending rapidly in front of eye; snout pointed, lower jaw much the shorter; fontanel continued as a groove to the occipital, not to the tip of the process or the dorsal plate; dorsal plate bat-shaped, a large foramen on either side of it in front; interorbital and snout narrow; depth of head greater than its width, 1.5 in its length. Eye oval, 1.75 times as long as high.

Maxillary barbel reaching pectoral, having numerous small barblets; mental barbels papillose. Distance of dorsal spine from tip of snout 2.5 in the length.

Dorsal spine a little longer than snout and half the eye. Pectoral spine a little longer than the dorsal spine, reaching the ventrals. Base of adipose less than the length of the eye.

Lateral shields highest above end of anal, their height 1.33 of the length of the eye. Humeral process more than three times as long as broad.

Belly white, sides with an increasing amount of pigment toward the back;

base of dorsal and sides of the spine dotted, rest of fin hyaline, except a conspicuous black spot near the tip of the first three dorsal rays.

Subfamily AUCHENIPTERINÆ.

CENTROMOCHLUS Kner.

Centromochlus KNER, SB. Akad. Wiss. Wien, XXVI, 1857, 430 (*megalops* = *heckelii*).

Glanidium (*ex* Reinhardt, MS.) LÜTKEN, Dan. Vidensk.-Selsk. Skr., XII, 1874, 31 (*albescens*).

Type, *Centromochlus megalops* Kner.

Mental barbels in two pairs; adipose fin shorter than the anal; anal short, 7–11; mouth terminal; jaws equal; caudal forked; V. 6.

67. **Centromochlus aulopygius** Kner. (Plate XX, fig. 1.)

Centromochlus aulopygius KNER, SB. Akad. Wiss. Wien, XXVI, 1857, 432, pl. 8, fig. 25 (Rio Guaporé).—GÜNTHER, Catalogue, V, 1864, 198 (Essequibo).—EIGENMANN and EIGENMANN, Proc. Cal. Acad. Sci., (2), I, 1888, 157 (Cudajas); Occasional Papers Cal. Acad. Sci., I, 1890, 270.—PELLEGRIN, Bull. Mus. d'Hist. Nat., V, 1899, 158 (Apuré).—EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 395.

One specimen, 65 mm. Creek below Potaro Landing. (C. M. Cat. No. 1727.)

One specimen, 65 mm. Wismar. (I. U. Cat. No. 12643.)

Head 3.75–4.25; depth 4–5; D. I,4 or I,5; A. 9 or 10; eye 5 in snout, 3 in head, 2 in interorbital.

Head blunt, bullet-shaped; tail compressed; top of head finely granular; an ovate fontanel, its posterior margin over the last third of the eye; jaws subequal; teeth conical, fixed, in narrow bands; lower margin of gill-opening on a level with the upper margin of the pectoral spine; maxillary barbel reaching slightly beyond the middle of the pectoral spine; mental barbels reaching beyond base of post-mentals, the post-mentals not to base of pectoral.

Dorsal spine a little shorter than the pectoral spine, as long as the head; anterior margin of dorsal with large antrorse teeth, the posterior margin smooth; pectoral spine serrate on both margins, the teeth of the posterior margin larger. Ventrals not reaching to anal; anal rays crowded, especially in the Wismar specimen; adipose fin shorter than the dorsal.

Chocolate brown above, shading to white on the belly; sides of body and caudal with numerous horizontally-oval light spots; lower fins light.

Trachycorystes Bleeker.

Trachycorystes Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 88 (*typus* = *trachycorystes*).

Parauchenipterus Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 88 (*galeatus*).

Type, *Trachycorystes typus* Bleeker.

Mental barbels in two pairs; adipose fin shorter than the anal fin; anal 19–41; caudal obliquely truncate or slightly emarginate; outer margin of pectoral spine serrate.

Key to the Species of Trachycorystes.

a. Caudal oblique.

b. Dorsal spine longer than the pectoral spine, which is 1.5 in the head; head covered with smooth skin..... **glaber.**

bb. Pectoral spine longer than dorsal spine, about as long as head; head granular, or covered with thin skin in the young; A. 22–28..... **galeatus.**

aa. Caudal emarginate; A. 19 or 20; dorsal spine serrate on its anterior edge; pectoral spine as long as the head..... **obscurus.**

68. **Trachycorystes glaber** (Steindachner).

Auchenipterus glaber Steindachner, "Süsswasserfische Südöstlichen Brasilien," iii, 1876, 97, footnote (Demerara).

Trachycorystes glaber Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 154 (name only); Occasional Papers Cal. Acad. Sci., I, 1890, 272, 275.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 395.

No specimens of this species were obtained. It is known from the types in the Vienna Museum.

D. I,5; A. 23; dorsal spine smooth on outer, weakly serrate on inner margin, longer than pectoral spine, 1.25 in the head; pectoral spine 1.5 in the head; caudal obliquely rounded.

69. **Trachycorystes galeatus** (Linnæus).

Silurus galeatus Linnæus, Syst. Nat., ed. 12, I, 1766, 503 (based on Seba, Locupl. Rer. Nat. Thes. Acc. Descr., III, 1748, pl. 29, fig. 7).—Gmelin, Syst. Nat., I, iii, 1788, 1357.—Bloch, Ausl. Fische, VIII, 1794, 39, pl. 369, fig. 1.—Bloch and Schneider, Syst. Ichth., 1801, 384.

Pimelodus galeatus Lacépède, Hist. Nat. Poiss., V, 1803, 97, 114 (South America).

Auchenipterus galeatus Günther, Catalogue, V, 1864, 196 (Guiana).—Peters, MB. Akad. Wiss. Berlin, 1877, 470 (Calabozo).

Parauchenipterus galeatus Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 88 (name only); "Silures de Suriname," 1864, 45 (Surinam).

Trachycorystes galeatus EIGENMANN and EIGENMANN, Proc. Cal. Acad. Sci., (2), I, 1888, 155 (Pernambuco; San Gonçallo; Rio San Francisco, below the falls; Tabatinga; Teffé; Rio Puty); Occasional Papers Cal. Acad. Sci., I, 1890, 279.—EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 396.

Auchenipterus maculosus CUVIER and VALENCIENNES, Hist. Nat. Poiss., XV, 1840, 216 (Cayenne).—MÜLLER and TROSCHEL, in Schomburgk, Reisen, III, 1848, 639 (Essequibo).—KNER, SB. Akad. Wiss. Wien, XXVI, 1857, 425 (Marabitanos).—GÜNTHER, Catalogue, V, 1864, 196 (Surinam; Essequibo).—VAILLANT, Bull. Soc. Philom., (7), IV, 1880, 154 (Calderon).

Auchenipterus immaculatus CUVIER and VALENCIENNES, Hist. Nat. Poiss., XV, 1840, 218 (Cayenne).

Auchenipterus punctatus CUVIER and VALENCIENNES, Hist. Nat. Poiss., XV, 1840, 219 (Brazil ?).—MÜLLER and TROSCHEL, in Schomburgk, Reisen, III, 1848, 629 (Essequibo).—KNER, SB. Akad. Wiss. Wien, XXVI, 1857, 425 (Rio Branco).

Auchenipterus lacustris LÜTKEN, Dan. Vidensk.-Selsk. Skr., XII, 1875, 148, with fig. (Rio das Velhas).

Auchenipterus robustus GÜNTHER, Catalogue, V, 1864, 197 (Demerara).

Trachycorystes robustus EIGENMANN and EIGENMANN, Proc. Cal. Acad. Sci., (2), I, 1888, 156 (name only).

One specimen, 110 mm. Mud-flats, Demerara River, below Wismar. (C. M. Cat. No. 1717*a*.)

One specimen, 132 mm. Barima River. (C. M. Cat. No. 1718*a*.)

Five specimens, 116–160 mm. Aruka River. (C. M. Cat. No. 1719*a*; I. U. Cat. No. 12096*a–b*.)

Eleven specimens, 99–195 mm. Lama Stop-Off. (C. M. Cat. No. 1720*a–b*; I. U. Cat. No. 12093.)

Four specimens, 130–228 mm. Georgetown trenches. (C. M. Cat. No. 1721*a*; I. U. Cat. No. 12094.)

One specimen, 167 mm. Maduni Creek. (C. M. Cat. No. 2229.)

Four specimens, 91–140 mm. Chipoo Creek. (C. M. Cat. No. 1722*a–b*; I. U. Cat. No. 12095.)

Head 4–4.5; depth 3.5–4; D. 1,6; A. 22–27, most frequently 24; V. 6; P. I,6. Eye 1.5–2 in snout, 5.5–6 in head, 3.5–4 in interorbital.

Head heavy, its width equal to its length, depressed, profile but little concave at the nape, rounded forward, the lower jaw entering the profile; upper surface of head finely granular in the old, covered with thin smooth skin in the young;

fontanel surrounded by bone; maxillary barbel reaching to or beyond tip of the humeral process, mental barbel 2.5–3 times as long as the eye.

Dorsal spine equal to head without the snout or a little longer but not equal to the length of the head, rough in front, with recurved hooks for over half its length from the tip on the posterior margin; pectoral spine as long as the head, with antrorse teeth in front and larger retrorse teeth behind; caudal obliquely rounded.

Color variable, much lighter in those inhabiting muddy water, with a light band across the head behind the eye, the dorsal plate also light, sides strigate; much darker to black in those inhabiting clear waters, the sides strigate.

The specimens from Chipoo Creek, a tributary of the Ireng, differ from those near the coast in having the maxillary barbels a little shorter, reaching to or not quite to the tip of the humeral process, the mental barbels 1.5–1.75 times as long as the eye.

70. Trachycorystes obscurus (Günther). (Plate XVII, fig. 2.)

Auchenipterus obscurus Günther, Ann. and Mag. Nat. Hist., (3), XII, 1863, 442 (Essequibo); Catalogue, V, 1864, 195.

Trachycorystes obscurus Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 154; Occasional Papers Cal. Acad. Sci., I, 1890, 275.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 396.

I have examined the types in the British Museum and two specimens in the Berlin Museum, all collected by Ehrhardt.

No specimens of this species were secured by me.

The species is readily distinguished by its emarginate caudal.

D. I,5; A. 19–20; maxillary and post-mental barbel extending to, or somewhat beyond, the tip of the humeral process; mental barbel 2 or 3 times as long as the eye; dorsal serrate along its anterior edge; pectoral serrate along both edges; dorsal spine shorter than the pectoral spine, which equals the head in length; caudal emarginate, the upper lobe scarcely longer than the lower. Uniform brownish black.

Pseudauchenipterus Bleeker.

Felichthys Swainson, Class. Fishes, Amph., and Rept., II, 1839, 305 (sp).—Swain, Proc. Acad. Nat. Sci. Phila., 1882, 281 (*nodosus*).

Pseudauchenipterus Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 88 (*nodosus*).

Type, *Silurus nodosus* Bloch.

71. **Pseudauchenipterus nodosus** (Bloch). (Plate XX, fig. 2.)

Silurus nodosus Bloch, Ausl. Fische, VIII, 1794, 35, pl. 368, fig. 1 (Tranquebar?).—Bloch and Schneider, Syst. Ichth., 1801, 383.

Arius nodosus Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 70 (copied).

Auchenipterus nodosus Müller and Troschel, Horæ Ichth., III, 1849, 11.—Kner, SB. Akad. Wiss. Wien, XXVI, 1857, 424 (Surinam).—Günther, Catalogue, V, 1864, 194 (British, Dutch, and French Guiana).

Pseudauchenipterus nodosus Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 88 (name only); "Silures de Suriname," 1864, 43, pl. 11, fig. 1, pl. 13, fig. 6 (Surinam).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 396.

Felichthys nodosus Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 154 (Pará; Bahia); Occasional Papers Cal. Acad. Sci., I, 1890, 291.

Auchenipterus furcatus Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 211 (Guiana).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 629 (Essequibo).

Pseudauchenipterus guppyi Regan, Proc. Zool. Soc. London, 1906, 387 (Trinidad).

Parauchenipterus pascadæ Regan, Proc. Zool. Soc. London, 1906, pl. 23.

Twenty specimens, 210–290 mm. Georgetown market. (C. M. Cat. No. 1723*a–e*; I. U. Cat. No. 12097.)

Three specimens, 137–145 mm. Mahaica. (C. M. Cat. No. 1724*a*; I. U. Cat. No. 12098.)

Two specimens, 212 and 227 mm. Mud-flats of Demerara River, near Wismar. (C. M. Cat. No. 1725*a*; I. U. Cat. No. 12099.)

Head 4.2; depth 45–4.75, D. I,6; A. 21 or 22; V. 8; P. 1,7. Eye about 1 in snout, 4.25 in head, 2.5 in interorbital.

Subtriangular in front, the head blunt, the tail compressed; maxillary barbel reaching posterior third of pectoral spine, mental barbel beyond base of pectoral, post-mental to middle of pectoral spine; head nearly as broad as long; frontal bones pitted, not much swollen; lower jaw included.

Dorsal spine 3–3.6 in the length, feebly serrate behind; pectoral spine 3.5–3.75 in the length, its outer margin striate, its inner finely serrate. Caudal forked; anal slightly emarginate.

Back and sides dark blue; an undulating white streak follows the lateral line, dividing with it on the caudal; area above anal lighter than the rest of the sides; upper and lower margin of caudal light, the hinder margin black; tips of remaining fins light.

AUCHENIPTERUS Cuvier and Valenciennes.

Auchenipterus CUVIER and VALENCIENNES, Hist. Nat. Poiss., XV, 1840, 207 (*nuchalis*).

Evanemus MÜLLER and TROSCHEL, Horæ Ichth., III, 1849, 11 (*colymbetes*).

Type, *Hypophthalmus nuchalis* Spix.

Mental barbels arranged in a line near the symphysis; a short adipose fin; anal long; ventrals with 12 to 15 rays; pectorals I,11.

KEY TO THE SPECIES OF AUCHENIPTERUS.

a. Mandibular barbels extending to the tip of the pectoral.....demeraræ.
aa. Mandibular barbels extending to the lower angle of the gill-opening.....brevior.

72. **Auchenipterus demeraræ** sp. nov. (Plate XXI, fig. 1.)

Type, 115 mm. Wismar. (Carnegie Museum Catalog of Fishes No. 1714.)

Cotype, 115 mm. Malali. (C. M. Cat. No. 1713.)

Cotypes, two specimens, 101 and 118 mm. Wismar and mud-flats just below Wismar. (I. U. Cat. No. 12091.)

Similar to *Auchenipterus nuchalis* (Spix), but with a lateral band.

Head 5.25; depth 4.75; D. I,6; A. 41 to 44; V. 12; P. I,11; eye 3 in head, 1.5 in interorbital, 1 in snout; depth of caudal peduncle 2 in the head.

Head short, blunt, depressed; body much compressed; occipital process as long as wide, fontanel as long as the pupil, its anterior edge but slightly in advance of the posterior margin of the eye; lower jaw slightly included, the teeth in very narrow bands; gill-membranes free to behind the lower margin of the pupil; maxillary barbel extending to the tip of the pectoral, mandibular barbels to the middle of the pectorals; distance from tip of snout to dorsal 4.33 in the length, the spine equal to snout and eye, with a few recurved notches on the posterior margin near the tip; pectoral spine but little shorter than the head, smooth in front, with recurved teeth along its entire posterior margin; pectorals not reaching ventrals, ventrals to about the sixth anal ray; highest anal ray equals snout and eye; middle caudal rays about half as long as the outer.

Sides everywhere peppered; a dark median band from the gill-opening to the caudal; dorsal and caudal dusky, the tip of the upper caudal lobe sometimes quite dark; lower fins hyaline.

73. **Auchenipterus brevior** sp. nov.

Type, 71 mm. Tumatumari. (Carnegie Museum Catalogue of Fishes No. 1715*a*.)

Cotypes, twenty specimens, 50–73 mm. Tumatumari. (C. M. Cat. No. 1716 *a–d*; I. U. Cat. No. 12108.)

These specimens differ from *demerarœ* notably in one observed particular: the mandibular barbels extend to about the lower angle of the gill-opening, not to the pectoral.

The maxillary barbels are as long as in *demerarœ*; depth 5.33.

Subfamily Ageneiosinæ.

Tympanopleura[19] gen. nov.

Type, *Tympanopleura piperata* sp. nov.

Maxillary barbels only, short. Air-bladder projecting into the abdominal cavity, naked laterally, the skin over it forming a large pseudo-tympanum; snout short, about equal to the eye; profile very concave; first dorsal and first pectoral rays pungent; origin of anal equidistant from rictus and middle caudal rays.

74. **Tympanopleura piperata** sp. nov. (Plate XX, fig. 3.)

Type, a male, 64 mm. Crab Falls. (Carnegie Museum Catalog of Fishes No. 1708.)

Cotypes, two males and five females, 57–61 mm. Crab Falls. (C. M. Cat. No. 1709*a*; I. U. Cat. No. 12090.)

This is evidently a young fish. To what extent the large, protruding air-bladder and the large pseudo-tympanum are characters of immaturity I am unable to say. The short snout very probably is due to the age of the specimen.

Head 4.5; depth 4.75; D. I,5 or 6; A. 31; V. 7; P. I,9; Br. 7; eye 1 in snout, 2.8 in head, 1 in space between the eyes below.

Profile much concave; fontanel open in front, continued as a groove to above the posterior margin of the pupil; snout rounded, the gape short; maxillary barbel in the male with an osseous base extending to below the anterior margin of the eye, the fleshy tip a little farther; in the female, minute, fleshy, reaching the rictus; gill-opening extending to below the posterior margin of the eye; dorsal spine with minute teeth on its front margin, its posterior margin smooth in the male, with recurved teeth along its entire length in the female; pectoral spine smooth in front, with recurved teeth along its entire margin behind; a large pectoral pore. Distance of dorsal from snout 3.66 in the length; origin of anal equidistant from rictus and caudal; ventrals reaching past origin of anal; pectorals not to ventrals.

[19] τύμπανον, tympanum, πλευρά, side.

Sides everywhere lightly peppered with chromatophores; an hour-glass-shaped dark bar across the base of the caudal.

Ageneiosus Lacépède.

Ageneiosus Lacépède, Hist. Nat. Poiss., V, 1805, 132 (*armatus*); IX, 167.
Pseudageneiosus Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 108 (*davalla*).
Ageniosus Günther, Catalogue, V, 1864, 191 (sp.).

Type, *Ageneiosus armatus* Lacépède.

Maxillary barbels only; air-bladder minute, concealed under the peritoneum and largely covered with bone; no pseudo-tympanum. Snout much longer than the eye.

Key to the Guiana Species of Ageneiosus.

a. Caudal deeply forked.
  b. A. 45; back with obscure marblings; maxillary band of teeth comma-shaped, the teeth large; dorsal and pectoral spines slender, pungent; origin of anal a little nearer base of middle caudal rays than the rictus; pectorals not reaching ventrals. Head 4; P. I,14; Br. 9. **guianensis.**

aa. Caudal emarginate; dorsal and pectoral rays smooth on posterior margin, the pectoral ray not pungent.
  c. Dorsal spine strong, sinuate, rough or spinous in front; profile steep, concave, origin of anal equidistant from base of middle caudal rays and anterior margin of eye; pectoral falcate, the first ray reaching beyond origin of ventrals; head 3.66; P. I,14; Br. 9; A. 34, dark above, lighter below..... **brevifilis.**
  cc. First dorsal ray not spinous; profile nearly straight and horizontal; origin of anal a little nearer origin of pectoral than to base of middle caudal rays; pectoral rounded, not reaching ventrals; head 3.33; P. 16; Br. 10; A. 29. Conspicuously marked with light and dark. **marmoratus.**

75. Ageneiosus guianensis sp. nov. (Plate XXI, fig. 2.)

Type unique, a female, 175 mm. Wismar. (Carnegie Museum Catalog of Fishes No. 1712*a*.)

Head 4; depth 5.5; D. I,6; A. 45; V. 8; P. I,14; Br. 9; eye 3 in snout, 6 in head, 3.5 in space between the eyes below.

Profile concave, not very steep, snout much depressed; width of head 1.4 in its length; length of snout less than interocular width by about an orbital diameter; fontanel reaching above middle of eyes, the groove considerably farther; cleft of mouth 3 in the length of the head; half the maxillary barbel osseous, its tip reaching rictus; premaxillary band of teeth comma-shaped, widest in front, its width half the length of the eye, the teeth comparatively large. Gill-openings extending to below the posterior margin of the eye, the space between them about equal to the diameter of the eye.

Distance from snout to dorsal 3.6 in the length; the spine slender, with minute wide-set teeth on the anterior margin, more numerous minute teeth on the posterior margin; pectoral spine slender, pungent, slightly rough in front, with small curved teeth along its entire inner margin; caudal deeply forked, the middle rays not half as long as the outer rays, which are 4.5 in the length; origin of the anal a little nearer to the base of the middle caudal rays than to the rictus; ventrals reaching beyond origin of anal; pectorals four-fifths the distance to the ventrals.

Dark chocolate above, shading to the anal; ventral surface light; back obscurely marbled; dorsal, base and tips of caudal, upper surface of pectoral and ventral, except their last rays, dark.

This species is near *dentatus* Kner and *ucayalensis* Castelnau, but differs in the width of the head, the length of the snout, the mouth, color, etc.

76. Ageneiosus brevifilis Cuvier and Valenciennes.

Ageneiosus inermis (not *Silurus inermis* Linnæus or Bloch) Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 240, pl. 440 (Surinam).—Castelnau, Anim. Am. Sud, Poiss., 1855, 48 (Amazon).

Ageneiosus brevifilis Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 242 (Cayenne).—Kner, SB. Akad. Wiss. Wien, XXVI, 1857, 438 (Rio Cujabá).—Günther, Catalogue, V, 1864, 192 (River Capin, Pará); Proc. Zool. Soc. London, 1868, 229 (Xeberos).—Cope, Proc. Am. Philos. Soc., XVII, 1878, 676 (Peruvian Amazon).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 150 (name only); Occasional Papers Cal. Acad. Sci., I, 1890, 309.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 397.

Pseudageneiosus brevifilis Bleeker, "Silures de Suriname," 1864, 83, pl. 16, fig. 1 (Surinam).

Hypophthalmus dawalla Schomburgk, Fishes Brit. Guiana, I, 1841, 191, pl. 9 (Guiana).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 643.

Ageneiosus dawalla Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 150 (name only); Occasional Papers Cal. Acad. Sci., I, 1890, 309.

Ageniosus sebæ Günther, Catalogue, V, 1864, 192 (copied).

One specimen, a male, 445 mm. Lama Stop-Off. (C. M. Cat. No. 1711*a*.)

Head 3.66; depth 5; D. I,6; A. 34; V. 8; P. I,14; Br. 9; eye 3.5 in snout, 6.5 in head, 5.5 in space between the eyes below.

Profile steep, concave; head depressed, broad; fontanel reaching eye, the groove beyond the posterior margin of the eye; maxillary barbel osseous to near its

tip, tuberculate above, reaching the eye; premaxillary band of teeth .66 of the length of the eye, the teeth minute; gill-openings reaching to below the eye, the space between them equal to the eye.

Distance from snout to dorsal 3.66 in the length; the spine an orbital diameter shorter than the head, with short sharp teeth along its concave anterior margin, the posterior margin smooth; caudal emarginate; origin of anal equidistant from base of middle caudal rays and the anterior margin of the eye, its first rays thickened, osseous; ventrals emarginate, reaching to the third anal ray; pectorals subfalcate, the first ray not pungent, smooth on both margins, reaching the first or fifth ventral ray.

Steel-blue above, lighter below; dorsal spotted; upper surface of pectoral and anterior ventral rays steel-blue, the membranes white with dark spots; caudal margined with light; a submarginal dark band shading into the color of the caudal peduncle.

Bleeker's figure was based on his smaller specimen, and the markings are still visible on the fins. The barbel is however too long, not reaching the eye.

77. **Ageneiosus marmoratus** sp. nov. (Plate XXII, fig. 1.)

Type unique, a female, 175 mm. Creek below Potaro Landing. (Carnegie Museum Catalog of Fishes No. 1710.)

Readily distinguished by its conspicuous markings and short anal.

Head 3.33; depth 5; D. I,6; A. 29; V. 8; P. 16; Br. 10; eye 3.5 in snout, 6.3 in the head, 4 in the interocular space ventrad.

Head wedge-shaped, much depressed, the profile nearly straight and but little ascending; snout parabolic, the gape of the mouth very long, about three times as long as the eye; fontanel extending to the anterior margin of the eye, its groove to the posterior margin; premaxillary band of teeth half as wide as the eye, of nearly uniform width to near the posterior end of the band; maxillary barbel not reaching the rictus; gill-membranes free to below middle of the eye, the distance between the clefts not equal to the eye; distance from snout to dorsal spine 3 in the length; caudal emarginate; origin of anal but very little nearer base of pectoral spine than to base of middle caudal rays; first dorsal and pectoral rays not pungent, smooth on both margins.

Sides light, with spots and streaks of slaty; upper part of sides with five large dusky spots margined with darker, not meeting on the middle line; dorsal black, with a light band at base and another a little higher up; bases of caudal and anal colored like the sides, then a broad black band, then narrowly margined with hyaline; pectorals and ventrals black above, with a light band at the base.

Family IV. HELOGENEIDÆ Fam. nov.

< *Siluridæ anomalopteræ* GÜNTHER, Catalogue, V, 1864, 3, part.

Dorsal small, behind the middle of the body; anal long, its origin near the beginning of the fifth ninth of the body; dorsal and pectoral without spines; adipose fin minute; caudal forked; gill-membranes free from the isthmus; teeth few; six barbels; nares without barbels; eyes very small, directed upward and outward; air-bladder transversely uniform, not covered by bone.

So far known from one genus.

HELOGENES Günther.

Helogenes GÜNTHER, Ann. and Mag. Nat. Hist., (3), XII, 1863, 443 (*marmoratus*).

Type, *Helogenes marmoratus* Günther.

This genus agrees with *Hypophthalmus* in its long anal and the backward position of the dorsal, but differs from it in so many other essential characters that it is but remotely related to that genus.

Upper jaw heavy, the snout rounded, lower jaw included; vomerine teeth in two separate patches; upper jaw with two series of teeth, the inner obscure; lower jaw with a narrow band of teeth, some of the outer ones distinctly larger than the rest; head bullet-shaped, the eyes on side of head, superior; barbels not margined, the two mental barbels remote from each other, below the angle of the mouth; gill-membranes overlapping; about twelve branchiostegals; gill-rakers very short; fontanel reaching to the base of the occipital process; coalesced vertebræ with broad lateral processes; no dorsal or pectoral spines; eye without a free orbital margin; anal very long.

78. **Helogenes marmoratus** Günther. (Plate XXII, fig. 2.)

"Asicurrupa" (of the natives about the Kaieteur).

Helogenes marmoratus GÜNTHER, Ann. and Mag. Nat. Hist., (3), XII, 1863, 443 (Essequibo); Catalogue, V, 1864, 66 (Essequibo).—EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 398.

This species has been taken but once before.

Fifteen specimens, 39–82 mm. Creeks about Aruataima. (C. M. Cat. No. 1703*a–c*; I. U. Cat. No. 12085.)

Nineteen specimens, 39–71 mm. Creeks about Holmia. (C. M. Cat. No. 1704*a–c*; I. U. Cat. No. 12086.)

Eleven specimens, 68–86 mm. Potaro Highland. (C. M. Cat. No. 1705*a–c*; I. U. Cat. No. 12087.)

Fourteen specimens, 40–82 mm. Potaro Highland. (C. M. Cat. No. 1706*a–c*; I. U. Cat. No. 12088.)

Fourteen specimens, 32–80 mm. Creek at Tukeit Landing. (C. M. Cat. No. 1707*a–c*; I. U. Cat. No. 12089.)

This species is preeminently a species of the Guiana Plateau. The only place in the lowlands (with one doubtful exception) where it was secured is Tukeit, a short distance below the Kaieteur. Günther records this or a related species from the Essequibo. One specimen whose label was lost may have come from Kumaka.

Head 5.75–6.25; depth 4.25; D. 5 or 6; A. 37–40; V. 6. Eye 3 in snout, 8 in head, 4 in the distance between the eyes.

Head short, rounded, its width about equal to its length, its depth about equal to its length without the snout, covered with thick skin above. Maxillary barbel fitting into a groove below the eye, extending to or a little beyond the middle of the pectoral; mental and post-mental barbels close together, the mental barbel opposite the maxillary barbel, reaching to the tip of the pectoral; the post-mental a little shorter. Gill-membranes broad, overlapping, covered in front by a recurved fold of skin. Dorsal small, rounded, equidistant from caudal and occiput or a little nearer the latter; adipose fin very small, its distance from the dorsal equal to the length of the head; caudal broad, slightly forked, lower lobe the longer, about 3.5–4 in the length; distance from snout to anal about 1.25 in the length of the anal; anal margin rounded behind, the rest of its margin straight or but slightly rounded; ventrals reaching anal; pectorals to the ventrals.

Reddish brown, variously marbled; base of caudal dark, the fin then abruptly lighter; fins, especially the dorsal, ventrals and pectorals hyaline-margined.

Family V. HYPOPHTHALMIDÆ.

< *Siluridæ anomalopteræ* Günther, Catalogue, V, 1864, 3.

= *Hypophthalmidæ* Cope, Proc. Am. Assoc. Adv. Sci., XX, 1871, 331.

Dorsal over the anal, anal very long, its origin near the origin of the second third of the body. Eye placed low, the optic nerve ascending beneath the skin; a minute air-bladder on either side of the coalesced vertebræ, enclosed by their lateral processes, the scapula, and the process connecting the scapula with the basi-occipital.

Hypophthalmus Spix.

Hypophthalmus Spix, Selecta Gen. et Spec. Pisc. Bras., 1829, 16, pl. 9 (sp.).—Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 109 (*edentatus*).

Notophthalmus Hyrtl, Denkschr. Akad. Wiss. Wien, XVI, 1859, 17 (*marginatus* = *edentatus*).

Pseudohypophthalmus Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 109 (*fimbriatus* = *edentatus*).

Type, *Hypophthalmus edentatus* Spix.

79. Hypophthalmus edentatus Spix.

Hypophthalmus edentatus Spix, Selecta Gen. et Spec. Pisc. Bras., 1829, 16, pl. 9 (equatorial Brazil).—Günther, Catalogue, V, 1864, 67 (copied).—Cope, Proc. Am. Philos. Soc., XVII, 1878, 673 (Peruvian Amazon).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 120 (Pará); Occasional Papers Cal. Acad. Sci., I, 1890, 313.—Eigenmann and Bean, Proc. U. S. Nat. Mus., XXXI, 1907, 664 (Amazon).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 398.

Hypophthalmus marginatus Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 225, pl. 439 (Cayenne; Surinam).—Günther, Catalogue, V, 1864, 68 (copied).—Vaillant, Bull. Soc. Philom., (7), IV, 1880, 150 (Calderon).—Wright, Trans. Roy. Soc. Canada, III, sect. iv, 1886, 107–118, pls. 8–10 (important paper on structure).—Perugia, Ann. Mus. Genova, (2), X, 1891, — (Chaco Centrale).

Notophthalmus marginatus Hyrtl, Denkschr. Akad. Wiss. Wien, XVI, 1859, 17 (vertebræ 2 + 5 + 54).

Hypophthalmus longifilis Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 230 (Surinam).—Günther, Catalogue, V, 1864, 68 (Demerara; Surinam).—Bleeker, "Silures de Suriname," 1864, 88 (Surinam).

Hypophthalmus spixii Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 231 (copied).—Kner, SB. Akad. Wiss. Wien, XXVI, 1857, 446 (Rio Branco).

Hypophthalmus edentulus Castelnau, Anim. Am. Sud, Poiss., 1855, 47.

Hypophthalmus fimbriatus Kner, SB. Akad. Wiss. Wien, XXVI, 1857, 444, pl. 9, fig. 30 (Rio Negro).—Günther, Catalogue, V, 1864, 68 (copied).

Hypophthalmus perporosus Cope, Proc. Am. Philos. Soc., XVII, 1878, 673 (Nauta).—Steindachner, "Flussfische Südamerika's," iv, 1882, 4 (Rio Huallaga; Rio Amazonas).

Thirteen specimens, 270–485 mm. Wismar. (C. M. Cat. No. 1701*a–c*; I. U. Cat. No. 12084.)

One specimen, 445 mm. Morowhanna? (C. M. Cat. No. 1702.)

Head 3.8–4; depth 4.6–5; D. I,6; A. 64–68; eye about 10 in head; 5 in snout.

Much compressed, snout depressed, head rounded above, its lower surface flat, the eye at the lower margin of the head; jaws equal, the upper papery, the

lower heavier; no teeth; barbels all broadly fringed, the maxillary barbel about reaching tip of pectoral.

The four mental barbels but little shorter than the maxillary; gill-membranes widely separate, gill-rakers very numerous, 2–2.5 times as long as eye.

Dorsal small, nearer adipose than to tip of snout, widely separate from the occipital crest; base of adipose 1.5 times as long as eye; caudal forked; pectorals reaching to or beyond tips of ventrals and beyond origin of anal; anal very long, about 2 in the length. Upper part of head and sides above lateral line steel-blue, white below; pectoral, dorsal, and caudal dusky; anal white or nigrescent.

Family VI. PYGIDIIDÆ.[20]

> *Siluroidei trichomycteriformes* Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 112.
> *Siluridæ opisthopteræ* Günther, Catalogue, V, 1864, 4.
> *Siluridæ branchicolæ* Günther, Catalogue, V, 1864, 4.
= *Trichomycteridæ* Gill, Arrangement of the Families of Fishes, 1872, 19.
= *Pygidiidæ* Eigenmann and Eigenmann, Am. Nat., XXII, 1888, 649.

The characters are given in the key to the families, page 119.

Key to the Guiana Genera of Pygidiidæ.

a. Dorsal entirely in front of the ventrals; vomer with a series of conical teeth on each side; eye without free orbital margin; a maxillary and two pairs of mental barbels; each jaw with a narrow band of conical teeth. (*Cetopsinæ.*) ..... **Hemicetopsis.**

aa. Dorsal behind the ventrals; no teeth on vomer.

b. Mouth terminal, maxillary with two barbels of about equal size; a nasal barbel; gill-membranes free. (*Pygidiinæ.*) ..... **Pygidium.**

bb. Mouth inferior, very wide; one of the maxillary barbels minute; no nasal barbel; gill-membranes broadly united with the isthmus. (*Stegophilinæ.*) ..... **Ochmacanthus.**

Subfamily Cetopsinæ.

Hemicetopsis Bleeker.

Hemicetopsis Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 111.

Type, *Cetopsis candiru* Agassiz.

Dorsal in front of the ventrals; teeth conical, those on the vomer in a single series.

Key to the Guiana Species of Hemicetopsis.

a. Gill-membrane very broadly united to the isthmus, the gill-opening extending as far below as above the pectoral; posterior margin of the eye at the end of the first third of the head; ventrals scarcely reaching anus; head subglobose; chromatophores of the sides with their branches spreading backward and forward only, not upward and downward; maxillary barbel about half as long as the head; Br. 10. ..... **macilentus.**

[20] A family of mixed elements and hard to define.

aa. Gill-membranes scarcely united to the isthmus, extending much farther below than above the pectoral; posterior margin of the eye near the middle of the head; ventrals reaching beyond anus; more slender; chromatophores of the sides radiating in all directions; maxillary barbels reaching the tip of the opercle, but little shorter than the head; mental barbels reaching the edge of the gill-membrane, post-mentals a little beyond the edge of the gill-membrane when laid straight back. ..... **minutus.**

80. **Hemicetopsis macilentus** sp. nov. (Plate XXIII, fig. 1.)

Type, 55 mm. Creek below Potaro Landing. (Carnegie Museum Catalog of Fishes No. 1726.)

Cotype, 65 mm. Creek below Potaro Landing. (I. U. Cat. No. 12100.)

Head 3.33; depth 3.8; D. I,5; A. 23, V. 6; P. I,7; eye 3 in snout, 8 in head, 3 in distance between the eyes.

Head short, blunt; tail compressed; width of head equals its length without the snout; head covered with loose skin, which is minutely papillose; upper jaw projecting, the mouth wide, 1.5 in the length of the head; teeth hard, conical, those in the jaws in narrow bands, those on the vomer larger, in a single series, with sometimes an extra tooth near the end of the row; maxillary barbel about half the length of the head; space between gill-openings 2.5 in the length of the head.

Dorsal spine a little less than one-third the length of the head; caudal fin short, forked, the lobes about 4.5 in the length; ventrals free from each other and from the belly; pectoral spine about one-fifth of the length of the head.

Upper surface of head gray; sides with numerous chromatophores, whose rays branch forward and backward from the center of the cell, giving a strigose effect and looking like little bundles of sticks tied in the middle, hence the name.

81. **Hemicetopsis minutus** sp. nov. (Plate XXIII, fig. 2.)

Type unique, a specimen 22 mm. long. Amatuk Cataract. (Carnegie Museum Catalog of Fishes No. 1728.)

Differs from *macilentus* in having the color-cells regularly stellate, the ventrals reaching to origin of anal (to anus in *H. macilentus*) and the gill-membranes very narrowly united to the isthmus, almost free; barbels all reaching the gill-opening when laid straight back; posterior margin of the eye near the middle of the head (at the end of the first third in *H. macilentus*).

Subfamily Pygidiinæ.

Pygidium Meyen.

Trichomycterus Valenciennes, in Humboldt, Rec. Obs. Zool., II, 1833, 348 (*nigricans*), not *Thrichomycterus* Humboldt.

Thrychomycterus Cuvier and Valenciennes, Hist. Nat. Poiss., XVIII, 1846, 485 (misquoted).

Thrichomycterus Girard, U. S. Nav. Astron. Exped., II, 1855, 242 (misquoted).

Pygidium Meyen, Reise in Peru, I, 1835, 475 (*fuscum*).

Type, *Pygidium fuscum* Meyen.

Origin of the dorsal over or in front of the origin of the short anal; gill-membranes free from the isthmus; mouth terminal; ventrals present; two maxillary barbels; nasal barbels; opercle and preopercle with osseous prickles.

Key to the Guiana Species of Pygidium.

a. Origin of dorsal in front of the vertical from the origin of the anal; maxillary barbel reaching tip of opercle; snout about 2.5 in the head; nasal barbel reaching not quite to the tip of the maxillary barbel.

b. Head 6 in the length; the first pectoral ray with its filament equals the length of the head; sides and back with numerous spots, each larger than the eye, in about five series between the dorsal and anal..... **guianense.**

bb. Head 5 in the length; first pectoral ray with its filament equals the length of the head without the opercle; uniform yellowish brown above, lighter below; top of head marbled... **conradi.**

aa. Origin of anal under origin of dorsal, head 6 in the length; maxillary barbel reaching tip of pectoral, outer pectoral ray with its filaments equals the head in length; upper parts obscurely spotted..... **gracilior.**

82. **Pygidium guianense** Eigenmann.

Pygidium guianense Eigenmann, Ann. Carnegie Mus., VI, 1909, 11 (Aruataima, on the Potaro); Repts. Princeton Univ. Exp. Patagonia, III, 1910, 400.

This species is known from the type, taken in the cataracts of the Potaro River, above the Kaieteur.

Type, 77 mm. Aruataima Falls, Upper Potaro. (Carnegie Museum Catalog of Fishes No. 1003.)

Head 6; depth equals head in length; D. 9; A. 7; eye 4 in snout, 9.5 in head.

Head nearly as broad as long; maxillary barbel reaching to tip of opercle; teeth in bands of about four irregular series; origin of anal under middle of dorsal; dorsal fulcra extending forward to near the dorsal; caudal rounded; first pectoral ray prolonged in a filament nearly as long as the rest of the ray; round dark spots everywhere, except on belly and lower surface of head; caudal dusky, the margin light.

83. **Pygidium conradi** sp. nov.

Pygidium guianense Eigenmann, Ann. Carnegie Mus., VI, 1909, 11, part (Amatuk and Waratuk).

Type, 41 mm. Amatuk. (Carnegie Museum Catalog of Fishes No. 2212.)

Cotype, 34 mm. Waratuk. (I. U. Cat. No. 11710.)

These specimens were considered identical with *guianense*. The discovery of *Pygidium graeilior* makes it very probable that they are distinct. The differences are pointed out in the key.

This species is named for Mr. Bernard S. Conrad.

84. **Pygidium gracilior** sp. nov.

Type unique, 27 mm. Erukin. (Carnegie Museum Catalog of Fishes No. 1730.)

Head 6; depth 9; D. 8; A. 6; eye about 2 in the snout; interorbital a little greater than snout, snout 3 in the head.

Slender, head as broad as long; maxillary barbel reaching tip of pectoral; nasal barbel to origin of pectoral; outer pectoral ray prolonged, about equal to the head in length. Origin of the anal under origin of dorsal; distance from origin of dorsal to origin of caudal 3.5 in the length; length of caudal 5 in the length.

All upper parts obscurely spotted.

Subfamily Stegophilinæ.

Ochmacanthus[21] gen. nov.

Type, *Ochmacanthus flabelliferus* sp. nov.

In the *Annals of the Carnegie Museum*, IV, 118, I called attention to the fact that *Stegophilus insidiosus* and *Stegophilus reinhardti* "differ much from each other in the caudal fulcra and may represent two distinct genera." A new species from Guiana with the structure of *reinhardti* may be utilized to furnish a diagnosis of the new genus.

Two maxillary barbels, one of them minute; mouth large, wholly inferior; dorsal over anal; fully developed caudal rays much diverging from a narrow base; caudal fulcra greatly developed; eye above the mouth.

85. **Ochmacanthus flabelliferus** sp. nov.

Type, 33 mm. Konawaruk. (Carnegie Museum Catalog of Fishes No. 1729.)

Cotypes, two specimens, 34 and 35 mm. Konawaruk. (I. U. Cat. No. 12111.)

Head 5.33; depth 7; D. 8; A. 7; eye 1 in snout, 3.75 in head, 1 in space between the eyes.

Width of head equal to its length; snout semicircular in outline, the head depressed; mouth very wide, its width equal to the length of the head less half the

[21] *ὄχμος*, series, *ἄκανθα*, thorn.

snout; upper jaw with three series of teeth; teeth of the two outer series conical, those of the inner series broad, removed from the others, forming a solid palisade; no labial teeth; lower jaw with an outer series of long, curved, claw-like teeth in the lip, and four series in the jaw, of which the first is short, near the middle, the second extends farther to the sides, the third is longest, extending from the middle to the side of the jaw, the fourth is shorter again and confined to the sides, not reaching the median line of the jaw. Preopercle with nine claw-like erectile spines; opercle somewhat prolonged, carrying a bunch of nine spines similar to those of the preopercle above and behind the gill-opening. Gill-opening small, entirely above the level of the middle of the pectoral; outer maxillary barbel about as long as the eye, the inner one minute.

Pectorals partly adnate; ventrals small, free, reaching anal; dorsal about equal to the anal and but slightly farther forward.

Light, with numerous chromatophores more or less aggregated in places; a black spot on base of caudal.

Family VII. CALLICHTHYIDÆ.

= *Callichthyoidei* Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 82.

< *Siluridæ proteropodes* Günther, Catalogue, V, 1864, 4 (*Hypostomatinæ* in part.)

= *Callichthyidæ* Gill, Arrangement of the Families of Fishes, 1872, 19.—Eigenmann and Eigenmann, Occasional Papers Cal. Acad. Sci., I, 1890, 449.

Distinguished from all other fishes by the double series of dermal plates meeting along the middle of the sides. A small homogeneous group, confined to South American waters.

Key to the Guiana Genera of Callichthyidæ.

a. Two pairs of nuchal plates between occiput and dorsal plate; suture between humeral and coracoid processes extending almost horizontally to the posterior margin of the pectoral armature; a large opening between coracoid and clavicle below and in front of the pectoral spine.

b. Coracoid covered with skin. Sides of the head without bristles; no mental barbels; lower jaw with small bands of teeth on the sides; a naked area along dorsal and ventral surfaces; suborbital bones concealed; dorsal spine rudimentary; caudal rounded.....**Callichthys.**

bb. Coracoid exposed below; coracoid bone joined to the clavicle for its whole length. Two barbels at each rictus, none at the symphysis. Lower lip without barbels; a naked area along ventral surface; caudal rounded or emarginate; dorsal spine low and flat; pectoral spine serrate on inner margin in the young, outer margin and surfaces covered with bristles...**Hoplosternum.**

aa. Occipital with a narrow process extending to the dorsal plate. D. I,6–8; coracoid process exposed; suture between coracoid and humeral processes extending from the large pectoral pore obliquely downward and backward to the ventral margin of the pectoral armature; dorsal and pectoral spines long, pungent, their outer surfaces smooth.....**Corydoras.**

Callichthys Linnæus.

Callichthys Linnæus, Amoen. Acad., I, 1754, 317.—Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 294 (*asper* = *callichthys*).—Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 82 (*tamoata* = *callichthys*).

Cataphractus Bloch, Ausl. Fische, VIII, 1794, 80 (preoccupied in mammals).—Lacépède, Hist. Nat. Poiss., V, 1804, 124 (*callichthys*).—Swainson, Class. Fishes, Amph., and Rept., II, 1839, 304 (*depressus* = *callichthys*).

Type, *Silurus callichthys* Linnæus.

Characters given in the key to the genera.

86. Callichthys callichthys Linnæus.

Callichthys tamoata Linnæus, Mus. Adolphi Fred., 1754, 731.—Bleeker, "Silures de Suriname," 1864, 22 (Surinam).

Silurus callichthys Linnæus, Syst. Nat., ed. 10, I, 1758, 307 (America); ed. 12, I, 1766, 506.—Gmelin, Syst. Nat., I, iii, 1788, 1361.

Cataphractus callichthys Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 164 (Rio Janeiro; Pernambuco; Juiz de Fora; Bahia; Mendez; Macacos; Porto Seguro; Surinam).

Callichthys callichthys Eigenmann and Eigenmann, Occasional Papers Cal. Acad. Sci., I, 1890, 452.—von Ihering, Süsswasserfische d. Rio Grande do Sul, 1893, 21.—Eigenmann, Ann. N. Y. Acad. Sci., VII, 1894, 633 (Rio Grande do Sul).—Lahille, Rev. Mus. de la Plata, VI, 1895, 272 (Puerto Viejo).—Pellegrin, Bull. Mus. d'Hist. Nat., 1899, 158 (Apuré).—Eigenmann, Ann. Carnegie Mus., IV, 1907, 123 (Bahia Negra); Repts. Princeton Univ. Exp. Patagonia, III, 1910, 402.

Callichthys asper Quoy and Gaimard, Voy. Uranie et Physicienne, Zool., 1824, 232.—Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 302 (Cayenne; Rio Janeiro).—Kner, SB. Akad. Wiss. Wien, XVII, 1855, 107 (Pará Rio; Surinam; Bahia).—Castelnau, Anim. Am. Sud, Poiss., 1855, 38 (Bahia; name only).—Bleeker, Ichth. Arch. Ind. Prodr., I, 1858, 53.—Günther, Catalogue, V, 1864, 226 (Bahia; Pará).—Cope, Proc. Am. Philos. Soc., XVII, 1878, 681 (Nauta).—Perugia, Ann. Mus. Genova (2), X, 1891, 636 (Chaco Centrale).

Cataphractus depressus Swainson, Class. Fishes, Amph., and Rept., II, 1839, 304 (based on Bloch, pl. 377).

Callichthys cælatus Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 308 (Rio Janeiro).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 630 (trenches).—Günther, Catalogue, V, 1864, 227 (copied).

Callichthys læviceps Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 309 (= male).

Callichthys loricatus Gronow, Cat. Fish., ed. Gray, 1854, 157.

Callichthys hemiphractus Hensel, Archiv für Naturg., I, 1868, 374 (Costa da Serra; = the young).

Ten specimens, 69–142 mm. Small Creek at Holmia. (C. M. Cat. No. 1570 *a–c*; I. U. Cat. No. 11985.)

One specimen, 129 mm. Chipoo Creek. (C. M. Cat. No. 1571.)

One specimen, 106 mm. Nickaparoo Creek. (C. M. Cat. No. 1572.)

Seven specimens, 117–149 mm. Upper Essequibo. (C. M. Cat. No. 1573 *a–b*; I. U. Cat. No. 11986.)

Fifteen specimens, 60–129 mm. Kumaka. (C. M. Cat. No. 1574*a–c*; I. U. Cat. No. 11987.)

One specimen, 125 mm. Pacopoo Pass. (C. M. Cat. No. 2208.)

I have also examined the specimens recorded by Bleeker, and now in the Leiden Museum, and those in Amsterdam.

Head 4; depth 4.66–5, equal to its width; D. I,6; A. 5.5; plates $\frac{28–29}{26–28}$.

Head depressed, tail compressed; eye 6.5–8 in interorbital; inner rictal barbel reaching to near or beyond the tip of the humeral process; nuchal plates about twice as wide as the plates immediately behind them; snout broad, rounded; no teeth in the upper jaw, those in the lower jaw interrupted in the middle, confined to the side of the jaw. About fourteen small azygous plates in front of the adipose; fins all rounded. Uniform ashy or slaty, or more or less mottled or spotted; no definite markings.

Hoplosternum Gill.

Callichthys Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 294 (sp.).

Hoplosternum Gill, Ann. Lyc. Nat. Hist. N. Y., VI, 1858, 395 (*lævigatum* = *littorale*).

Type, *Callichthys lævigatus* Valenciennes.

Characters given in the key.

Key to the Guiana Species of Hoplosternum.

a. Caudal deeply emarginate; eight or nine azygous plates in front of the adipose, usually one between each pair of plates; one, rarely two, pairs of plates behind the dorsal without the azygous plates; three pairs of plates between occipital and dorsal. Uniform dark brown or black. . . **littorale.**

aa. Caudal rounded or but slightly emarginate; the azygous plates usually more numerous than the pairs of plates they separate; several pairs of plates meeting behind the dorsal; two pairs of plates between occipital and dorsal, the second pair notched to receive the dorsal fulcrum. Sides spotted or mottled . . . . . **thoracatum.**

87. **Hoplosternum littorale** (Hancock). (Plate XXIV, fig. 1.)

Callichthys littoralis Hancock, Zool. Journ., IV, 1828, 244 (Demerara).—Günther, Catalogue, V, 1864, 227 (Demerara; British Guiana; Trinidad).—Lütken, Vid. Med. Naturhist. For. Kjöbenhavn, 1874, 215 (Trinidad).—Vaillant, Bull. Soc. Philom., (7), IV, 1880, 165 (Calderon).—Steindachner, "Flussfische Südamerika's," iv, 1882, 6 (Rio Huallaga).—Jordan, Proc. U. S. Nat. Mus., IX, 1886, 559 (name only).—Boulenger, Ann. Mus. Genova (2), XIX, 1898, 126 (Puerto 14 de Mayo).—Vaillant, Nouv. Arch. Mus. d'Hist. Nat., (4), II, 1900, 124 (Carsevenne).

Hoplosternum littorale Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 164 (Surinam; Gurupa; Pará; Santarem; Tabatinga; Arary; Silva, Lake Saraca; Villa Bella; Porto do Moz; Lake Hyamary; Ueranduba); Occasional Papers Cal. Acad. Sci., I, 1890, 456.—Berg, An. Mus. Nac. Buenos Aires, IV, 1895, 136.—Eigenmann and Kennedy, Proc. Acad. Nat. Sci. Phila., 1903, 504 (Arroyo Carumbey and Yajamar; Estancia la Armonia).—Eigenmann, Ann. Carnegie Mus., IV, 1907, 123 (Bahia Negra); Repts. Princeton Univ. Exp. Patagonia, III, 1910, 402.

Callichthys subulatus Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 311 (Cayenne; Buenos Ayres).

Callichthys lævigatus Valenciennes, in d'Orbigny, Voy. Am. Mer., V, ii, 1847, pl. 5, fig. 2.—Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 314 (Buenos Ayres; Trinité).—Kner, SB. Akad. Wiss. Wien, XVII, 1855, 109 (no locality).—Perugia, Ann. Mus. Genova (2), X, 1891, 636 (Tucuman).

Hoplosternum lævigatum Gill, Ann. Lyc. Nat. Hist. N. Y., VI, 1858, 396 (Trinidad).—Bleeker, "Silures de Suriname," 1864, 24 (Surinam).

Callichthys albidus Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 316 (Cayenne).

Hoplosternum stevardii Gill, Ann. Lyc. Nat. Hist. N. Y., VI, 1858, 401 (Trinidad).

One specimen, 192 mm. Mahaica. (C. M. Cat. No. 1575.)

Seventeen specimens, about 164–180 mm. Georgetown market. (C. M. Cat. No. 1576*a–e*; I. U. Cat. No. 11988.)

Two specimens, about 188 mm. Botanic Garden. (C. M. Cat. No. 1585*a*; I. U. Cat. No. 11993.)

Head 3.4–3.5; depth 3.25; D. I,8; A. II,5.5. Plates $\frac{25}{23}$.

Snout somewhat pointed, depressed; dorsal profile a little more arched than the ventral; eye about 5 in interorbital; inner rictal barbel reaching to tip of

pectoral; nuchal plates about one-fifth wider than the plates immediately following; no teeth; about eight azygous plates between the dorsals, generally corresponding to the lateral plates; uniform slaty blue or black.

Dorsal rounded, caudal deeply emarginate, the outer rays prolonged; other fins lanceolate.

88. **Hoplosternum thoracatum** (Cuvier and Valenciennes). (Plate XXIV, fig. 2.)

Callichthys thoracatus Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 309, pl. 443 (Mana; Martinique).—Peters, MB. Akad. Wiss. Berlin, 1877, 471 (San Fernando de Apuré).—Kner, SB. Akad. Wiss. Wien, XVII, 1855, 108 (Surinam).—Günther, Catalogue, V, 1864, 228 (copied).—Jordan, Proc. U. S. Nat. Mus., IX, 1886, 559 (name only).

Callichthys (Hoplosternum) thoracatus Steindachner, "Fisch-Fauna des Cauca," etc., 1880, 14 (Cauca).

Hoplosternum thoracatum Gill, Ann. Lyc. Nat. Hist. N. Y., VI, 1858, 396.—Bleeker, "Silures de Suriname," 1864, 26 (Surinam).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 164 (Curupira; Tabatinga; Cudajas; Gurupa; Teffé; Lake Hyamary; Villa Bella; Pará; Ucranduba; Porto do Moz; Pernambuco; Obidos).—Eigenmann and Bean, Proc. U. S. Nat. Mus., XXXI, 1907, 665 (Amazon).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 402.

Callichthys longifilis Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1849, 317 (Cayenne).—Schomburgk, Fishes Brit. Guiana, I, 1841, 150, 151, 154, drawings No. 22 (Curassarraka).—Günther, Catalogue, V, 1864, 228 (Surinam; River Cupai).

Hoplosternum longifilis Gill, Ann. Lyc. Nat. Hist. N. Y., VI, 1858, 396 (Trinidad).—Cope, Proc. Am. Philos. Soc., XVII, 1878, 681 (Nauta).—Bleeker, "Silures de Suriname," 1864, 27 (Surinam).

Callichthys personatus Ranzani, Nov. Com. Acad. Scient. Insti. Bonon., V, 1842, 322, pl. 24.

Callichthys exaratus Müller and Troschel, in Schomburgk, Reisen, III, 1848, 630 (Guiana).[22]

Callichthys pictus Müller and Troschel, in Schomburgk, Reisen, III, 1848, 630.

Callichthys sulcatus Kner, SB. Akad. Wiss. Wien, XVII, 1855, 110 (Rio Branco and Marabitanos).

? *Callichthys chiquitos* Castelnau, Anim. Am. Sud, Poiss., 1855, 38, pl. 18, fig. 2 (Chiquitos).

[22] In the type of this species there are four azygous plates separating as many paired plates in front of the second dorsal.

Thirteen specimens, 97–98 mm. Chipoo Creek. (C. M. Cat. No. 1577*a–e* and 1583*a–b*; I. U. Cat. No. 11989.)

One specimen, 105 mm. Packeoo Falls. (C. M. Cat. No. 1578.)

Seventy-four specimens, 58–109 mm. Gluck Island. (C. M. Cat. No. 1579*a* and 1580*a–o*; I. U. Cat. No. 11990.)

Five specimens, 61–120 mm. Kumaka. (C. M. Cat. No. 1581*a–b*; I. U. Cat. No. 11991.)

Three specimens, 114–124 mm. Mud creek in Aruka. (C. M. Cat. No. 1582*a*; I. U. Cat. No. 11992.)

One specimen, 158 mm. Botanic Garden, Georgetown. (C. M. Cat. No. 1584.)[23]

I have also seen the specimens in the Leiden Museum and the Museum at Amsterdam.

Head 3.5–4; depth 3.16–3.66; D. I,8; A. I,6–8; plates $\frac{25–26}{23–24}$.

There is considerable variation in shape and color. Snout depressed, more pointed than in *thoracatum*. Eye 5.5–6 in interorbital; nuchal plates as wide as, or half as wide again, as the plates following them, which are notched to receive the fulcrum of the dorsal; inner rictal barbels extending past origin of ventrals, sometimes past their tip. Four to six (in Aruka River specimens) or seven to eight azygous plates between the lateral plates in front of the adipose dorsal; four pairs of plates meet behind the dorsal; depth in front of the adipose fin in some of the Chipoo specimens equals the length of the head, but more than an orbital diameter less than the head in Gluck Island specimens; dorsal rounded; caudal slightly emarginate when closed, truncate when opened. Sides spotted or mottled; ventral surface white, with more or less conspicuous black spots; dorsal and caudal spotted, the latter usually with a light bar at the base, the Gluck Island specimens with a broad dark median band, the tip of the caudal dusky.

Two specimens in the Amsterdam Museum have the coracoids meeting along their entire length below.

Corydoras Lacépède.

Corydoras Lacépède, Hist. Nat. Poiss., V, 1803, 145 (*geoffroyi* = *punctatus*).
Hoplisoma Swainson, Class. Fishes, Amph., and Rept., II, 1839, 304 (*punctata*).
Hoplosoma Gill, Ann. Lyc. Nat. Hist. N. Y., VI, 1858, 402 (*punctata*).
Gasterodermus Cope, Proc. Am. Philos. Soc., XVII, 1878, 681 (type ?).

Type, *Corydoras geoffroyi* Lacépède.

Characters as given in the key.

[23] In this specimen the caudal is nearly uniform beyond the lighter bar at its base and there are but five azygous plates which correspond to paired plates.

89. **Corydoras punctatus** (Bloch). (Plate XXIV, fig. 3.)

Cataphractus punctatus Bloch, Ausl. Fische, VIII, 1794, pl. 377, fig. 2.—Bloch and Schneider, Syst. Ichth., 1801, 108.—Lacépède, Hist. Nat. Poiss., V, 1803, 125 (Surinam).

Hoplisoma punctata Swainson, Class. Fishes, Amph., and Rept., II, 1839, 304 (name only).

Callichthys punctatus Günther, Catalogue, V, 1864, 229 (Essequibo).

Corydoras punctatus Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 166 (José Fernandez).—? Perugia, Ann. Mus. Genova, (2), X, 1891, 635 (Rio de la Plata).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 403.

Corydoras geoffroyi Lacépède, Hist. Nat. Poiss., V, 1803, 147 (locality ?).

Corydoras ambiacus Cope, Proc. Acad. Nat. Sci. Phila., 1871, 280 (Ambyiacu River, Ecuador).

Gasterodermus ambiacus Cope, Proc. Am. Philos. Soc., XVII, 1878, 681 (Nauta).

Four specimens, 43–58 mm. Mud-flats of Demerara River. (C. M. Cat. No. 1560*a–b*; I. U. Cat. No. 11977.)

Three specimens, 48–52 mm. Erukin. (C. M. Cat. No. 1561*a*; I. U. Cat. No. 11978.)

Sixteen specimens, 28–40 mm. Malali. (C. M. Cat. No. 1562*a–e*; I. U. Cat. No. 11979.)

One specimen, 45 mm. Below Packeoo Falls. (C. M. Cat. No. 1563*a*).

Two specimens, 29–36 mm. Tumatumari. (C. M. Cat. No. 1564*a*; I. U. Cat. No. 11980.)

Twenty-nine specimens, 39–54 mm. Creek below Potaro Landing. (C. M. Cat. No. 1565*a–e*; I. U. Cat. No. 11984.)

Two specimens, 50 mm. Kumaka. (C. M. Cat. No. 1566*a*; I. U. Cat. No. 11981.)

One specimen, 29 mm. Wismar. (C. M. Cat. No. 1567*a*.)

Sixteen specimens, 29–45 mm. Konawaruk. (C. M. Cat. No. 1568*a–e*; I. U. Cat. No. 11982.)

Sixteen specimens, 28–38 mm. Rockstone sand-bank. (C. M. Cat. No. 1569*a–e*; I. U. Cat. No. 11983.)

Head 3.25–3.33; depth 2.6–3; D. I,7–8; A. I,6 or I,7; plates $\frac{24}{22}$ or $\frac{23}{21}$.

Profile strongly curved; eye 3.5–4 in the head; maxillary barbels reaching lower angle of gill-opening or shorter. Origin of dorsal equidistant from tip of snout and tip of spine of adipose or upper caudal fulcra; dorsal spine smooth in

front, roughened behind, nearly equal to, or slightly longer than, the pectoral spine. Three or four azygous plates in front of the adipose; caudal forked, the lobes a little longer than the head.

Color variable; a more or less conspicuous black band across the head at the eyes; dorsal black, or partially or faintly so, the color sometimes continued on the sides, other fins hyaline. Sides profusely spotted, quite plain, or the plates margined with black.

Family VIII. LORICARIIDÆ.

< *Siluroides* Cuvier, Règne Animal, ed. 1, II, 1817, 199.
= *Goniodontes* Agassiz, Selecta Gen. et Spec. Pisc. Bras., 1829, 1.
= *Loricata* Kner, Denkschr. Akad. Wiss. Wien, VI, 1853, 75.
= *Loricaroidei* Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 77.
< *Hypostomatina* Günther, Catalogue, V, 1864, 11.
< *Loricariidæ* Gill, Arrangement of the Families of Fishes, 1872, 19.
= *Loricariidæ* Eigenmann and Eigenmann, Am. Nat., XXII, 1888, 649; Occasional Papers Cal. Acad. Sci., I, 1890, 351.
> *Loricariidæ* Regan, Trans. Zool. Soc. London, XVII, 1904, 191.

Sides and back and sometimes the lower surface covered with bony plates, which are sometimes provided with teeth-like spines. Mouth wholly inferior, provided with a broad disk-like lip. Maxillary bones thin, with a terminal barbel, which is partly united with the oval disk; no mental or nasal barbels. Teeth, if present, hooked and usually two-lobed at the tip; the active ones in a single series; premaxillaries separate from each other, box-shaped, and filled with numerous relay teeth; dentaries separate from each other and constructed like the premaxillaries.

No teeth on the palate; no frontal or occipital fontanels. Dorsal fin present, situated on the abdominal portion of the vertebral column, and not connected with the occipital by processes. Adipose fin, if present, composed of a spine and a thin membrane. Anal fin short. Gill-membranes joined to the isthmus, the gill-openings restricted to the sides. Intestinal canal elongate, coiled upon itself.

Key to the Guiana Genera of Loricariidæ.

a. Tail short; caudal peduncle compressed, cylindrical, or moderately depressed; hæmal spines all simple; lower, and fourth upper pharyngeals not toothed; belly naked, or with minute granular plates; intestinal canal very long. (*Plecostominæ.*)
  b. Premaxillaries and dentaries nearly equal in length.
    c. Opercle and interopercle little and not independently movable; snout granular to its margin.
      d. Adipose fin present.
        e. Sides and back covered with plates; dorsal with seven rays. . . . . **Plecostomus.**
        ee. Sides and back covered with plates; dorsal with thirteen rays. . . . . **Pterygoplichthys.**

eee. Sides and back mostly naked, with a few minute plates near the tail. . . **Lithogenes.**

dd. No adipose fin; a low crest between the dorsal and caudal; margin of snout and head granular. . . . . **Corymbophanes.**

cc. Interopercle movable, usually with spines or bristles.

f. Snout granular to its margin, or with bristles; D. I,6 or 7.

g. Sides of the head without bristles. . . . . **Hemiancistrus.**

gg. Sides of the head with bristles, short in the female, much longer in the male. **Pseudancistrus.**

ff. Snout naked.

h. No tentacles. . . . . **Xenocara.**

hh. Snout with tentacles. . . . . **Ancistrus.**

bb. Premaxillaries much shorter than the dentaries and with fewer teeth, not united. Much depressed, of small size. . . . . **Lithoxus.**

aa. Tail long, depressed, with a single series of plates on the sides; intestinal canal usually not much longer than the body. Hæmal spines of the vertebræ above the anal bifid; lower and fourth upper pharyngeals toothed. (*Loricariinæ.*)

i. Teeth in the jaws in small or moderate number, not setiform; a more or less distinct orbital notch.

j. Snout rounded or pointed, not much produced.

k. Lips with numerous cirri and marginal fringes; no distinct anal plate. . . . . **Loricaria.**

kk. Lips papillose; a distinct anal plate. . . . . **Loricariichthys.**

jj. Snout produced, with a long rostrum.

l. Snout expanded at the tip, with recurved hooks. . . . . **Hemiodontichthys.**

(*ll.* Snout not expanded. . . . . **Reganella.**)*

ii. Teeth numerous, setiform; orbit circular, without a distinct notch.

m. Dorsal opposite the ventrals.

n. Snout rounded, not produced as a rostrum. . . . . **Harttia.**

(*nn.* Snout produced into a rostrum. Sides of the head in the male margined with bristles. **Sturisoma.**)

mm. Dorsal opposite the anal. Very slender. . . . . **Farlowella.**

Subfamily Plecostominæ.

Plecostomus Gronow.

Plecostomus Gronow, Mus. Ichth., I, 1754, 24; Zoophyl., 1763, 127 (sp.).—Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 77 (*brasiliensis*).

Hypostomus Lacépède, Hist. Nat. Poiss., V, 1803, 144 (*guacari*).—Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 489 (*plecostomus*).

Type, *Plecostomus brasiliensis* Bleeker = *Plecostomus plecostomus* (Linnæus).

Snout granular; no spines or bristles about head; an adipose fin; sides and back completely covered with plates.

A genus of over twenty species, four of which have been recorded from Guiana.

* Extralimital genera and species, when included in the tables, are in parentheses.

KEY TO THE GUIANA SPECIES OF PLECOSTOMUS.

a. Occipital bordered by a single nuchal plate.

b. Length of mandibular ramus 2.4–4 in interorbital; color of upper and lower caudal lobes almost alike, spotted in the adult, barred in the young. Lower surface of head and body almost completely covered with granules in the adult; outer caudal rays greatly prolonged, sometimes three times as long as the shortest.....plecostomus.

bb. Length of mandibular ramus 2 in interorbital. Lower caudal lobe dark, plain; sometimes the entire caudal plain, sometimes the upper lobe spotted; lower surface naked (except sometimes in the largest specimens a few granular plates between the pectorals); outer caudal rays scarcely more than thrice the length of the middle one.....hemiurus.

(*bbb*. Lower surface and head completely covered with granular plates in specimens 205 mm. long; mandibular ramus 2 in interorbital; twenty-seven or twenty-eight scutes.....robini.)

aa. Occipital bordered by a median nuchal plate, and one or several small plates on each side.

c. Caudal peduncle normally formed, the scutes of the fourth series not strongly angulated. watwata.

cc. Caudal peduncle broad and flat below, the scutes of the fourth series strongly angulated. emarginatus.

90. Plecostomus plecostomus (Linnæus).

Loricaria plecostomus LINNÆUS, Syst. Nat., ed. 12, I, 1766, 508 (America).—GMELIN, Syst. Nat., I, iii, 1788, 1363.—BLOCH, Ausl. Fische, VIII, 1794, pl. 374.—BLOCH and SCHNEIDER, Syst. Ichth., 1801, 124.—HYRTL, Denkschr. Akad. Wiss. Wien, XVI, 1859, 18.

Hypostomus plecostomus SCHOMBURGK, Fishes Brit. Guiana, I, 1841, 139 (Rio Branco).—MÜLLER and TROSCHEL, in Schomburgk, Reisen, III, 1848, 643 (Takutu and Rio Branco).—KNER, Denkschr. Akad. Wiss. Wien, VII, 1853, 263 (Ypanema; Mattogrosso; Barra do Rio Negro; Surinam).

Plecostomus plecostomus EIGENMANN and EIGENMANN, Proc. Cal. Acad. Sci., (2), I, 1888, 169; Occasional Papers Cal. Acad. Sci., I, 1890, 406 (Silva, Lake Saraca; Pará; Hyavary; Coary; Rio Puty).—KINDLE, Ann. N. Y. Acad. Sci., VIII, 1895, 253 (Marajo on Rio Tocantins).—LAHILLE, Rev. Mus. la Plata, VI, 1895, 272 (Island Santiago).—EIGENMANN and BEAN, Proc. U. S. Nat. Mus., XXXI, 1907, 665 (Amazon).—EIGENMANN, Ann. Carnegie Mus., IV, 1907, 122 (Corumbá; Asuncion; Rio Apa; Arroyo Trementina); Repts. Princeton Univ. Exp. Patagonia, III, 1910, 403.

Hypostomus guacari LACÉPÈDE, Hist. Nat. Poiss., V, 1803, 145 (America).

Loricaria flava SHAW, Gen. Zool., V, 1805, 38, pl. 101.

Plecostomus flavus VAILLANT, Bull. Soc. Philom., (7), IV, 1880, 155 (Calderon).

Plecostomus bicirrhosus GRONOW, Cat. Fish. ed. Gray, 1854, 158.– GÜNTHER, Catalogue, V, 1864, 231, part.—KNER and STEINDACHNER, Abhandl. K. Bayer.

Akad., II Kl., X, 1865, 60.—Hensel, Archiv für Naturg., XXXVI, 1870, 75 (Rio Cadeo).—Steindachner, "Flussfische Südamerika's," ii, 1881, 109.

Hypostomus robinii Gill, Ann. Lyc. Nat. Hist. N. Y., VI, 1858, 46 (Trinidad).

Plecostomus brasiliensis Bleeker, "Silures de Suriname," 1864, 7 (Surinam).

Plecostomus seminudus Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 169 (Brazil); Occasional Papers Cal. Acad. Sci., I, 1890, 409.

Plecostomus boulengeri Eigenmann and Kennedy, Proc. Acad. Nat. Sci. Phila., 1903, 502 (Paraguay).

One specimen, 370 mm. Georgetown. (C. M. Cat. No. 1541.)

One specimen, 148 mm. Kumaka. (C. M. Cat. No. 1542.)

Three specimens, 164–210 mm. Wismar. (C. M. Cat. No. 1543*a*; I. U. Cat. No. 11962.)

Head 3; depth 5–5.75; D. I,7; A. I,4; scutes 26; eye 6; interorbital 2.66 in the head; mandibular ramus 2.75 in the interorbital.

Occipital with a blunt keel, bordered by a single plate behind; plates forward of the adipose largely keeled.

Dorsal spine equal to pectoral spine, about equal to the length of the head; base of dorsal equal to its distance from the tip of the spine of the adipose.

Reddish-brown, with olive spots, smallest on the head, absent on the belly; dorsal with a series of spots along the anterior part of the rays, sometimes confluent into bars, alternating with reddish bars. Caudal with alternating bars of olive and rusty.

91. **Plecostomus hemiurus** sp. nov. (Plate XXV, fig. 1.)

Plecostomus hemiurus Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 407 (name only).

Type, 201 mm. Amatuk. (Carnegie Museum Catalog of Fishes No. 1544.)

Cotypes, four specimens, 158–180 mm. Amatuk. (C. M. Cat. No. 1545*a*; I. U. Cat. No. 11963.)

Seven specimens, 27–113 mm. Waratuk. (C. M. Cat. No. 1546*a–e*; I. U. Cat. No. 11964.)

Four specimens, 68–150 mm. Crab Falls. (C. M. Cat. No. 1547*a*; I. U. Cat. No. 11965.)

Two specimens, 70–87 mm. Rockstone. (C. M. Cat. No. 1548; I. U. Cat. No. 11966.)

One specimen, 71 mm. Gluck Island. (C. M. Cat. No. 1549.)

Two specimens, the larger 190 mm. Ireng? (C. M. Cat. No. 1550; I. U. Cat. No. 11967.)

One specimen, 132 mm. Botanic Garden. (C. M. Cat. No. 1586*a*.)

This species differs from *Plecostomus plecostomus* notably in color and in the length of the mandibular ramus.

Head 3; depth 5–5.5; D. I,7; A. I,4; scutes 25 or 26 + 1. Width of head an orbital diameter less than its length, its depth about 2 in the length, 3.5 in the snout; eye 6 in the head, interorbital 3; mandibular ramus 2 in the interorbital.

Supraorbital slightly raised, a blunt median ridge on occipital forward to above eye; occipital bordered by a single plate; some of the plates distinctly, but feebly, keeled; ventral surface naked (except in the Ireng specimens, in which there are a few minute granular plates between the pectorals).

Dorsal spine variable, less than, or considerably longer than, the head, base of

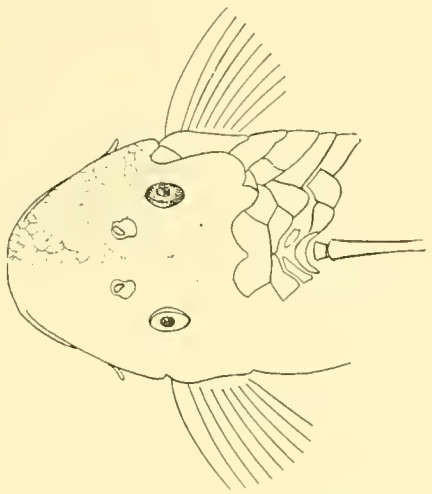

Fig. 34. *Plecostomus hemiurus* Eigenmann. *Type*. C. M. Cat. No. 1544.

dorsal equal to its distance from the caudal. Caudal oblique, emarginate, the lower rays usually less than twice the length of the middle rays; ventrals reaching middle of anal; pectorals to second third of ventrals or beyond.

Dark brown, with dark olive spots, smallest on the head, absent on the belly; dorsal spotted along the basal half or near its tip; caudal sometimes uniform dark brown, its upper lobe sometimes colored like the dorsal, as well as the upper surface of ventrals and pectorals.

92. Plecostomus watwata (Hancock). (Plate XXVI, fig. 1.)

Hypostomus watwata Hancock, Zool. Journ., IV, 1829, 245 (Georgetown).

Hypostomus plecostomus (not of Linnæus) Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 489 (Maracaibo).

Hypostomus verres Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 494 (Cayenne).

Plecostomus verres Regan, Trans. Zool. Soc. London, XVII, 1904, 209.

Hypostomus commersonii (not of Cuvier and Valenciennes) Müller and Troschel, in Schomburgk, Reisen, III, 1848, 631 (Takutu).

? *Hypostomus panthcrinus* Kner, Denkschr. Akad. Wiss. Wien, VII, 1854, 267 (Rio Guaporé).

Plecostomus bicirrhosus Günther, Catalogue, V, 1864, 231, part.

One specimen, 273 mm. Mahaica. (I. U. Cat. No. 11961.)

Two specimens, 128–435 mm. Georgetown. (C. M. Cat. No. 1540.)

There are also five specimens in the Amsterdam Museum, probably from Surinam.

Head 3.25–3.5; depth 4.66–6; D. I,7; A. I,4; scutes 28. Eye 6–8 in the head; interorbital 2.25 in the head; mandibular ramus about 3 in the interorbital.

Occipital with a well-marked median ridge, bordered behind by a median and several lateral plates; supraocular ridge continued on the upper part of the sides as a keel; all plates, except those on the caudal peduncle, keeled.

Dorsal spine about equal to head or pectoral spine; base of dorsal equal to its distance from the tip of the spine of the adipose.

Olive, everywhere with darker spots, smallest on the head and largest on the belly; fins banded in the young, spotted in the old.

In the specimen at the Berlin Museum mentioned by Schomburgk as *commersonii* the occipital is bordered by a large median and one small lateral plate on each side.

93. Plecostomus emarginatus Cuvier and Valenciennes.

"Warra-warra"; "Morutta"; "Wacari."

Hypostomus emarginatus Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 500 (Brazil).—Kner, Denkschr. Akad. Wiss. Wien, VII, 1854, 260 (Barra do Rio Negro).

Plecostomus emarginatus Günther, Catalogue, V, 1864, 233.—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 167; Occasional Papers Cal. Acad. Sci., I, 1890, 400 (Cudajas; Santarem; Manacapurú; Tonantins; Obidos; Fonteboa; Tabatinga; Hyavary; São Paulo; Goyaz); Proc. U. S. Nat. Mus., XIV, 1891, 40.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 406.

Hypostomus squalinum Schomburgk, Fishes Brit. Guiana, I, 1841, 142, pl. 3 (Rio Branco; Rio Negro; Rio Essequibo).

Hypostomus squalitus Müller and Troschel, in Schomburgk, Reisen, III, 1848, 142 (Essequibo; Rio Branco; Takutu).

Hypostomus horridus Kner, Denkschr. Akad. Wiss. Wien, VII, 1854, 259.

Plecostomus horridus Günther, Catalogue, V, 1864, 232.—Peters, MB. Akad. Wiss. Berlin, 1877, 471 (Calabozo).

Plecostomus scopularius Cope, Proc. Acad. Nat. Sci. Phila., 1871, 55, 286, pl. 16, figs. 1, 2 (Ambyiacu).

Plecostomus biseriatus Cope, Proc. Acad. Nat. Sci. Phila., 1871, 285, pl. 16 (Amazon).—Eigenmann and Eigenmann, Occasional Papers Cal. Acad. Sci., I, 1890, 409.

? *Plecostomus virescens* Cope, Proc. Acad. Nat. Sci. Phila., 1874, 137 (Upper Amazon); Proc. Am. Philos. Soc., XVII, 1878, 681 (Peruvian Amazon); XXXIII, 1894, 101.—Eigenmann and Eigenmann, Occasional Papers Cal. Acad. Sci., I, 1890, 408.

Plecostomus villarsi Lütken, Overs. Kgl. Dan. Vidensk.-Selsk. Forh., 1874, 211 (Caracas).—Steindachner, "Fisch-fauna Magdalenen-Stromes," 1878, 26, pl. 7.—Eigenmann and Eigenmann, Occasional Papers Cal. Acad. Sci., I, 1890, 408.

Plecostomus tenuicauda Steindachner, "Fisch-fauna Magdalenen-Stromes," 1878, 24, pl. 6 (Magdalena); "Fisch-fauna des Cauca," etc., 1880, 11 (Cauca).

Plecostomus annæ Steindachner, Flussfische Südamerika's," ii, 1881, 12, pl. 3, fig. 2.

While no specimens were secured, it is not at all improbable that this species will be found in British Guiana. So far it has been recorded only by Schomburgk, who may have seen the common species of the Essequibo, *Plecostomus hemiurus*.

Head 3.33–4; depth 6–7; D. I,7; A. I,4. Scutes 28 to 30. Eye 5–11 in the head; interorbital 2.33–2.66; mandibular ramus 3–4 in the interorbital. Width of head 1.13–1.25 in its length, snout 1.75–1.85 times. Eight or nine plates between the dorsals, fourteen to fifteen behind the anal; dorsal spine as long as the head, the last ray half as long. Dark spots on the head, body, and fins, those on the dorsal usually arranged in two series between each pair of rays.

Pterygoplichthys Gill.

Pterygoplichthys Gill, Ann. Lyc. Nat. Hist. N. Y., VI, 1858, 408 (*duodecimalis*).

Liposarcus Günther, Catalogue, V, 1864, 238 (sp.).

Type, *Hypostomus duodecimalis* Cuvier and Valenciennes.

94. Pterygoplichthys multiradiatus (Hancock).

Hypostomus multiradiatus Hancock, Zool. Journ., IV, 1828, 226 (Demerara).

Liposarcus multiradiatus Günther, Catalogue, V, 1864, 238 (Demerara).

Pterygoplichthys multiradiatus Eigenmann and Eigenmann, Occasional Papers Cal. Acad. Sci., I, 1890, 433; Proc. U. S. Nat. Mus., XIV, 1891, 42.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 408.

The following description is by Günther and is based on the type in the British Museum:

"D. 1/13. A. 5. P. 1/6. V. 1/5. L. lat. 29.

"Head not depressed, its length being two-sevenths of the total (without caudal); a rather prominent ridge runs from the eye to below the nostril; occiput with a rather elevated ridge, scutes of the nape bicarinate. Barbel longer than the eye, which is rather small, its diameter being nearly one-fourth of the width of the interorbital space. Interopercular without any spines. Thorax and belly entirely granulated. Dorsal fin much longer than high, the length of its base being equal to its distance from the extremity of the snout; the length of its anterior rays equals that of the head; there are six scutes between the two dorsal fins. (Caudal fin injured.) Eleven scutes between anal and caudal. The pectoral spine does not extend on to the middle of the ventral. Scutes of the body with a serrated keel. Ferruginous grey."

Lithogenes Eigenmann.

Lithogenes Eigenmann, Ann. Carnegie Mus., VI, 1909, 6.

With the characters of *Plecostomus*, but the dermal armature reduced to a few ossicles on the back behind the adipose and along a median line from above the origin of the anal to the caudal.

95. Lithogenes villosus Eigenmann. (Plate XXVI, figs. 2–4.)

Lithogenes villosus Eigenmann, Ann. Carnegie Mus., VI, 1909, 6.

Type unique, 44 mm. Aruataima Falls, Upper Potaro. (Carnegie Museum Catalog of Fishes No. 1002.)

Head 3.5; depth 7; D. 8; V. I,4; P. I,8; eye 6 in snout, 8 in head, 2.75 in interorbital; width of head equaling snout and orbit; width behind the pectorals about one-fifth greater than the height.

Oral disk large, margined by a series of incisions; lips smooth, with the faintest rugosities; a bunch of about twenty-five blunt villi in immediate association with the dentary; barbel equal to prenasal part of the snout, measuring from the base

of the barbel; free part of barbel equaling eye; a narrow free membrane from the barbel margining the lip outside of the incised inner margin from the barbel to a point behind the angle of the mouth.

Dentary with two teeth, each with two widely diverging cusps; premaxillary with eight teeth, each with two nearly parallel cusps, of which the inner one is much the longer.

Origin of the dorsal above the middle of the ventrals, the first ray not much more than half as long as the second, not spinous, the highest ray a little less than the snout; spine of the adipose two-fifths of the length of the snout, covered with a few spinules, its tip nearly reaching end of base of adipose part of the fin; caudal rather deeply emarginate, the lower lobe the longer; origin of anal half-way between tip of dorsal and origin of adipose; outer ventral ray very thick and fleshy, covered with spines, its base much wider than that of the rest of the fin, reaching a little more than half-way to anal, its length equal to the snout; pectoral reaching to near tip of ventrals, its spine not much larger than the rest of the rays, with a few prickles.

Naked except for a double series of plates along the ventral surface of the caudal peduncle from near the tip of the anal, which curve up on either side of the caudal to the base of the middle rays; about fourteen platelets along the middle of the sides from above the origin of the anal to the base of the middle caudal rays, widest above the tip of the anal, where they are a little wider than the eye; a double series of plates on the back, beginning on either side of the spine of the adipose to the caudal; outer caudal rays with prickles, a few spinelets on the caudal.

A dark band from the eye forward, increasing in width to above the base of the maxillary; back and upper part of sides marbled; caudal dark, the outer rays lighter.

For comparison I have added a figure of the *Neoplecostomus granosus* (Plate XXVI, fig. 5).

Corymbophanes Eigenmann.

Corymbophanes Eigenmann, Ann. Carnegie Mus., VI, 1909, 5.

Type, *Corymbophanes andersoni* Eigenmann.

Allied to *Rhinelepis*. No adipose fin, this being replaced by a low median ridge, extending from the tip of the dorsal to the caudal; no externally visible occipital crest.

96. Corymbophanes andersoni Eigenmann. (Plate XXVII, figs. 1–3.)

Corymbophanes andersoni Eigenmann, Ann. Carnegie Mus., VI, 1909, 5.

Type unique, 86 mm. Aruataima Falls, Upper Potaro. (Carnegie Museum Catalog of Fishes No. 1001.)

Head 3.66 in the length, measured to end of opercle and end of the lateral plates; depth 6; D. I,7; A. I,4; V. I,5; P. I,6; lateral line 24; eye 5.5 in snout, 7.5 in head to end of opercle, 3 in interorbital.

Oral disk everywhere thickly papillose, the papillæ largest along the margin of the upper lip and smallest at the angle of the mouth; barbel about 2.5 in the snout, its free portion less than orbit in length, its ventral surface papillose; maxillary and dentary of about equal length, a little less than 1.5 in the interorbital, each jaw with numerous minute teeth.

Ventral surface entirely naked; margin of snout in front of base of barbels naked; predorsal scales not regular; posterior margin of skull concave on each side of the occipital crest, which is indicated by a point; no ridges or grooves about the head; lateral plates straight, not keeled; a rather broad naked area along the dorsal.

Origin of dorsal in front of the vertical from the ventrals; ventrals a little in advance of the middle; highest dorsal ray reaching to about the middle of the last ray, 4.5 in the length; caudal emarginate, the lower lobe slightly the longer; origin of anal under vertical from middle of last dorsal ray; ventrals reaching middle of anal, pectorals past origin of ventrals.

Dark, with faint lighter spots; fin-rays dark, the membranes hyaline.

This species, obtained at my farthest point, is named for Mr. C. Wilgress Anderson, Government Surveyor, an explorer in the Potaro and Roraima regions.

Hemiancistrus Bleeker.

Hemiancistrus Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 78 (*medians*).—Eigenmann and Eigenmann, Occasional Papers Cal. Acad. Sci., I, 1890, 417.

Type, *Ancistrus medians* Kner.

Teeth small; snout granular to its margin, without bristles; interopercle with spines; an adipose fin.

A genus of about a dozen species, ranging from the Pacific slope of Panama to eastern Peru and Paraguay.

Three species seem to occur in British Guiana, although only one was actually secured. They may be distinguished as follows:

Key to the Guiana Species of Hemiancistrus.

a. Interorbital 2.66 in the head; depth 8 in the length; head 2.6 times as long as deep; mandibular ramus 2.33 in interorbital..... **schomburgki.**

aa. Interorbital 3.5 in the head; depth 4–4.5 in the length; head 1.66–1.75 times as long as deep; mandibular ramus 1.8 in the interorbital; lower surface naked..... **megacephalus.**

aaa. Interorbital 2 in the head; depth 4.75 in the length; mandibular ramus 2 in the interorbital; occipital bluntly keeled; lower surface partly covered..... **braueri.**

97. Hemiancistrus schomburgki Günther.

Chætostomus schomburgkii Günther, Catalogue, V, 1864, 245 (British Guiana).

Hemiancistrus schomburgkii Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), II, 1889, 43; Occasional Papers Cal. Acad. Sci., I, 1890, 420.—Kindle, Ann. N. Y. Acad. Sci., VIII, 1895, 254.

Ancistrus schomburgkii Regan, Trans. Zool. Soc. London, XVII, 1904, 233 (Guiana).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 408.

No specimens were secured.

"Depth of body 8 times in the total length, length of head 3 times. Head nearly as broad as long and $2\frac{3}{5}$ times as long as deep. Diameter of eye $4\frac{2}{3}$–$5\frac{2}{3}$ times in the length of head, interorbital width $2\frac{2}{3}$ times, length of snout $1\frac{1}{5}$ times. Length of mandibular ramus $2\frac{1}{3}$ times in the interorbital width. Snout broad, rounded; supraorbital edges not raised; supraoccipital flat, without median ridge; temporal plates not carinate; interopercular armed with 20–25 slender spines with curved tips, the longest equal to twice the diameter of eye. Scutes spinulose, not carinate, 25 in a longitudinal series, 6 between dorsal and adipose fin, 11–12 between anal and caudal. Supraoccipital bordered posteriorly by a median scute and by one on each side. Lower surface of head and abdomen naked (in the young). D. I,7, the first ray $\frac{3}{4}$ the length of head; length of base of dorsal nearly equal to its distance from the adipose fin. A. I,4. Pectoral spine not reaching the base of ventral. Caudal peduncle 3 times as long as deep. Brownish, clouded with darker; dark spots on the fins.

"Total length 75 mm."—*Regan.*

98. Hemiancistrus megacephalus Günther.

Chætostomus megacephalus Günther, Proc. Zool. Soc. London, 1868, 232 (Surinam ?).

Hemiancistrus megacephalus Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), II, 1889, 44; Occasional Papers Cal. Acad. Sci., I, 1890, 420; Proc. U. S. Nat. Mus., XIV, 1891, 41.—Kindle, Ann. N. Y. Acad. Sci., VIII, 1895, 253.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 408.

Ancistrus megacephalus Regan, Trans. Zool. Soc. London, XVII, 1904, 234 (Guiana).

Chætostomus macrops Lütken, Vid. Med. Naturhist. For. Kjöbenhavn, 1874, 209 (Surinam).—Steindachner, "Flussfische Südamerika's," ii, 1881, 24, pl. 5, fig. 3.

Nine specimens, 86–185 mm. Amatuk. (C. M. Cat. No. 1536*a*–*b*; I. U. Cat. No. 11958.)

One specimen, 107 mm. Warraputa. (C. M. Cat. No. 1537*a*.)

Five specimens, 25–94 mm. Waratuk. (C. M. Cat. No. 1538*a–b*; I. U. Cat. No. 11959.)

Head 2.8–3; depth 4.5–5.2; D. I,7; A. I,4; scutes twenty-four or twenty-five, counting the one on the caudal; four pairs of scutes between the dorsals, nine to eleven plates behind the anal.

Eye 5–5.5; interorbital 3.5–3.75; mandibular ramus 1.4–1.6 in interorbital; opercle with bristles, curved at their tips, entirely retractile under the opercle, the longest in the adult male a little longer than the eye; margin of snout granular, the granules becoming bristle-like in adult males. Lower surface naked; supraorbital slightly raised in smaller specimens, head and body otherwise without keels; scutes with numerous spiniferous lines; occipital pointed, bordered by a notched median and two lateral plates.

Dorsal spine slightly less than head in length; base of dorsal at least equal to its distance from the caudal; ventrals reaching middle of anal; pectoral spine to near middle of ventral or beyond; caudal oblique, emarginate.

Dark; obscure whitish spots on upper surface; dorsal membrane nearly uniform, the rays alternately light and dark; caudal with vertical bands, increasing in number with age; upper surface of pectoral and ventral with spots or bars.

99. **Hemiancistrus braueri** sp. nov. (Plate XXVIII, figs. 1–2.)

Hypostomus itacua (not of Cuvier and Valenciennes), Müller and Troschel, in Schomburgk, Reisen, III, 1848, 631 (Takutu).

Two specimens, 110–120 mm. Guiana (Schomburgk). Berlin Museum No. 3174. The larger one is the type.

Head 2.8; depth at occiput 4.75; D. I,8; A. I,4; plates twenty-seven, counting the one on the caudal; five plates between the dorsal fin and the adipose fulcrum; fourteen plates behind the anal, counting all the fulcra; eye 5 in the head, interorbital 3; mandibular ramus 2 in the interorbital.

Head rather deep; none of the scales carinate; supraorbitals elevate, a distinct median keel on the occipital which is superficially divided into a number of fields; temporal plates not carinate; interopercle armed with about forty slender spines with curved tips, the spines completely revertible, the longest not quite one and one-half times as long as the eye; lower surface of head naked; abdomen with a small patch of plates between the last ventral rays, and a large patch from between the gill-openings to the middle of the pectoral, the rest of the abdomen naked in the type, with minute prickles and a few plates along the middle in the cotype.

Dorsal spine an orbital diameter less than the length of the head; last dorsal ray attached by an insignificant membrane only; pectoral spine reaching second third of the ventral; ventral to the base of the last anal ray.

Fins uniformly dusky; sides and back obscurely blotched or banded.

The adipose is lacking in the cotype.

Pseudancistrus Bleeker.

Pseudancistrus Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 78 (*barbatus*).—Eigenmann and Eigenmann, Occasional Papers Cal. Acad. Sci., I, 1890, 434.

Type, *Hypostomus barbatus* Cuvier and Valenciennes.

Similar to *Hemiancistrus*, but the sides of the head with bristles, which are much larger in the male; interopercle with bristles; an adipose dorsal.

A genus with four or five species, of which three are found in Guiana.

Key to the Guiana Species of Pseudancistrus.

a. Length of base of dorsal equal to its distance from the caudal.
b. Slate-color, with numerous white dots; depth 5.66–6; eye 5 in the head.....**barbatus.**
bb. Uniform slate-color; depth 4.5–5; eye 6.5 in the head.....**nigrescens.**
aa. Length of base of dorsal nearly equal to its distance from the adipose.....**güntheri.**

100. **Pseudancistrus barbatus** (Cuvier and Valenciennes). (Plate XXVIII, fig. 3.)

Hypostomus barbatus Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 506 (La Mana).—Schomburgk, Fishes Brit. Guiana, I, 1841, 147.—Kner, Denkschr. Akad. Wiss. Wien, VII, 1853, 268, pl. 2, fig. 2 (locality ?).

Plecostomus barbatus Günther, Catalogue, V, 1864, 237 (Surinam).

Pseudancistrus barbatus Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), II, 1889, 45; Occasional Papers Cal. Acad. Sci., I, 1890, 435; Proc. U. S. Nat. Mus., XIV, 1891, 1842.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 409.

Ancistrus barbatus Regan, Trans. Zool. Soc. London, XVII, 1904, 240.

Hypostomus guttatus Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 508 (Surinam).

Plecostomus guttatus Günther, Catalogue, V, 1864, 237 (British Guiana).

Pseudancistrus guttatus Bleeker, "Silures de Suriname," 1864, 10, pl. 2, fig. 2, pl. 3, fig. 3 (Surinam).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), II, 1889, 45; Occasional Papers Cal. Acad. Sci., I, 1890, 435; Proc. U. S. Nat. Mus., XIV, 1891, 42.

Two specimens, 121–140 mm. Crab Falls. (C. M. Cat. No. 1533; I. U. Cat. No. 11968.)

Six specimens, 60–116 mm. Warraputa. (C. M. Cat. No. 1534*a–b*; I. U. Cat. No. 11956.)

Four specimens, 80–143 mm. Rockstone. (C. M. Cat. No. 1535*a–b*; I. U. Cat. No. 11957.)

Head 3; depth 5.66–6 to end of middle caudal plate; D. I,7; A. I,5. Twenty-five scutes, counting the one on the caudal; four pairs and an azygous plate between the dorsals; eleven plates behind the anal.

Width of head equal to its length or very little narrower; eye 5 in head, interorbital not quite 4; mandibular ramus but little less than interorbital; opercle in the male (C. M. Cat. No. 1533) with a bunch of graduate bristles, the longest 2.66 in the head, not completely retractile and not hooked; marginal bristle in the same male three-fourths the length of eye. Bristles scarcely evident in female. Head and plates without keels; belly entirely naked; dorsal spine equal to snout and eye or half eye. Base of dorsal equal to its distance from the caudal, last ray scarcely adnate. Caudal obliquely emarginate; ventrals reaching past origin of anal; pectorals past origin (to second third) of ventrals.

All but the ventral surface brown or slaty, with clear white dots.

The alimentary canal in a specimen 100 mm. long is 855 mm. in length.

101. **Pseudancistrus nigrescens** sp. nov. (Plate XXV, fig. 2.)

Pseudancistrus nigrescens Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 409 (name only).

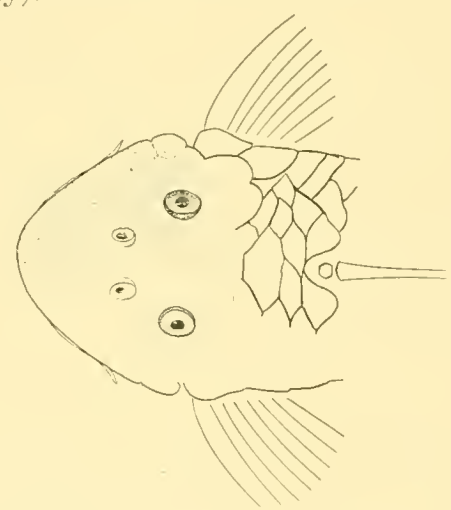

Fig. 35. *Pseudancistrus nigrescens* Eigenmann. *Type*. C. M. Cat. No. 1539.

Type, 182 mm. Amatuk. (Carnegie Museum Catalog of Fishes No. 1539.)
Cotype, 149 mm. Amatuk. (I. U. Cat. No. 11960).

Head about 3; depth 4.5–5; D. I,7; A. I,4; plates twenty-four; three or four paired plates between the dorsal, eleven behind the anal; width of head almost equal to its length; interorbital 3.5 in the head, eye 6.5; mandibular ramus 1.4 in the interorbital.

Head convex, without ridges or crest; plates of the body not carinate; occipital truncate where it meets the median plate behind it; interopercle with a few bristles; snout with a swollen margin, sparingly provided with bristles.

Dorsal spine a little longer than eye and snout; base of dorsal slightly less than its distance from the caudal; caudal oblique, slightly emarginate; ventrals reaching to middle of anal; pectorals about to second third of ventrals.

Nearly uniform dark slaty; dorsal with very faint light areas along the rays. Distal part of caudal slightly lighter, otherwise uniform; pectorals and ventrals in the smaller specimens like the caudal, very faintly blotched in the larger.

102. Pseudancistrus guentheri Regan.

Plecostomus guttatus (not of Cuvier and Valenciennes) Günther, Catalogue, V, 1864, 237.

Ancistrus guentheri Regan, Trans. Zool. Soc. London, XVII, 1904, 241 (British Guiana).

Pseudancistrus güntheri Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 409.

No specimens were collected. It is not certain whether the above references pertain to the area covered by this paper or not.

Head 3.25; depth 6; D. I,7; A. I,4; depth of head 2 in its length, eye 8, interorbital 3.33; mandibular ramus 1.25 in interorbital; snout with a broad naked area at its tip; dorsal spine two-thirds the length of the head; pectoral spine not quite reaching base of ventral. Color uniform.

Xenocara Regan.

Xenocara Regan, Trans. Zool. Soc. London, XVII, 1904, 251.—Eigenmann, Science, n. s., XXI, 1905, 794.

Type, *Ancistrus gymnorhynchus* Kner.

Interopercle freely movable, usually with spines; snout with a naked margin and without tentacles; mouth narrow, the mandible much less than the width of the interorbital; teeth in the upper jaw about as numerous as those in the lower

103. Xenocara gymnorhynchus (Kner).

? *Hypostomus nudiceps* Müller and Troschel, in Schomburgk, Reisen, III, 1848, 631 (Takutu).[24]

? *Chætostomus nudiceps* Günther, Catalogue, V, 1864, 249 (copied).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), II, 1889, 46; Occasional Papers Cal. Acad. Sci., I, 1890, 443; Proc. U. S. Nat. Mus., XIV, 1891, 43.

? *Ancistrus gymnorhynchus* Kner, Denkschr. Akad. Wiss. Wien, VII, 1854, 275 (Puerto Cabello).

Chætostomus gymnorhynchus Günther, Catalogue, V, 1864, 249 (Puerto Cabello). —Lütken, Vid. Med. Naturhist. For. Kjöbenhavn, 1874, 204.—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), II, 1889, 46; Occasional Papers Cal. Acad. Sci., I, 1890, 444; Proc. U. S. Nat. Mus., XIV, 1891, 43.—Regan, Trans. Zool. Soc. London, 1904, 254.

Xenocara gymnorhynchus Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 410.

One specimen, 58 mm. Gluck Island. (C. M. Cat. No. 1526.)

Head 3; depth at tip of occipital 6.5; interorbital 3.6 in the head; eye 5 in the head; width of head an orbital diameter less than its length; mandibular ramus 2 in interorbital. D. I,7; A. I,4. No tentacles on the snout; the naked area narrow, one-sixth the distance from tip of snout to posterior margin of eye along the median line. Six plates between the dorsals, ten behind the anal, twenty-five along the sides.

Last dorsal ray not quite reaching the adipose, base of dorsal nearly equal to its distance from tip of spine of the adipose fin; dorsal spine equal to snout and orbit.

Caudal sinuate, distinctly oblique, but the lower lobe a little longer than the upper, equal to the length of the head.

Blackish, with yellowish white, faintly ocellated spots; pectoral and ventrals with faint spots; dorsal and caudal narrowly margined with reddish.

[24] I have been able to examine the type of *nudiceps* in the Berlin Museum, 105 mm., No. 3180, Guiana. Schomburgk.

Head 2+; depth at occipital process 6+; interorbital 2.4 in the head; eye 5.5 in the head; width of the head an orbital diameter less than its length; mandibular ramus 3.4 in the interorbital; D. I,7; A. I,4; no tentacles about the snout; naked area at least one-third the distance from tip of snout to posterior margin of the eye along the median line; five plates between the last dorsal ray and the spine of the adipose, nine behind the anal, twenty-two along the sides. Pectoral reaching to the second fourth of the ventral; ventral beyond the base of the last anal ray. In other distinguishable characters it is like the specimen from Gluck Island.

Ancistrus Kner.

Ancistrus Kner, Denkschr. Akad. Wiss. Wien, VII, 1853, 272 (sp.).—Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 77 (*cirrhosus*).

Thysanocara Regan, Ann. and Mag. Nat. Hist., (7), XVII, 1906, 95 (*cirrhosus*). Type, *Ancistrus cirrhosus* Kner.

I have elsewhere (*Science*, n. s., XXI, 1905, 794) given my reasons for the use of the name *Ancistrus* for this genus.

Premaxillaries and dentaries of nearly equal length; interopercle movable; snout naked, with tentacles. About eleven species.

Key to the Guiana Species of Ancistrus.[25]

a. Fins, especially the dorsal, with conspicuous cross-bands over rays and membranes; body with large whitish spots, the dark background reduced to vermiculations; ramus of the lower jaw 2.3–3 in the interorbital. ..... **temmincki.**

aa. Fins, especially the dorsal, with faint dark spots along the rays; mandibular ramus 2–3 in interorbital; interorbital 2.4 in the head; depth about equal to interorbital; naked portion of snout of the male reaching nearly half-way to posterior margin of the eye, with a Y-shaped series of tentacles; obscure, medium-sized light spots, especially on the ventral surface..... **cirrhosus.**

aaa. Fins, especially the dorsal, plain, or frequently with minute white dots, the dorsal and caudal often margined with lighter.

b. Mandibular ramus 2.75–3.75 in the interorbital; interorbital 2.25 in the head; dorsal and upper angle of caudal narrowly margined with light, or not margined; naked part of snout in the male with about four tentacles in a straight line; naked part extending one-fourth the distance to posterior margin of eye along median line. Minute white dots on fins and body. **hoplogenys.**

bb. Mandibular ramus 2.0–2.4 in the interorbital; dorsal and caudal conspicuously margined with white or yellow. Naked portion of snout, in adult male, reaching half-way to posterior margin of eye, in the female one-third the distance to posterior margin of eye. Interorbital 2.8–3 in head; depth 6.8 in the length. Tentacles in male in a Y-shaped figure. Occipital finely granular, the granules scarcely arranged in radiating lines; base of dorsal equal to the distance from base of last ray to tip of spine; caudal very oblique, the upper lobe about 1¼ the length of the lower; minute white dots on fins and body, otherwise plain black..... **lithurgicus.**

104. Ancistrus temmincki (Cuvier and Valenciennes).

Hypostomus temminckii Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 514 (Cayenne).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 631 (Takutu).

Ancistrus temminckii Bleeker, "Silures de Suriname," 1864, 11, pl. 1, fig. 3, pl. 2, fig. 2 (Surinam).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV,

[25] Regan gives *Ancistrus dolichoptera* Kner as found in Guiana. No definite locality is given. If it should be found within the region covered by the present paper it can readily be distinguished by its having D. I,8 or 9.

1891, 43.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 411.
Xenocara temminckii Regan, Trans. Zool. Soc. London, XVII, 1904, 254 (Guiana).

Two specimens, 74 and 56 mm. Packeoo Falls. (C. M. Cat. No. 1520*a*; I. U. Cat. No. 11946.)

Two specimens, 47 and 38 mm. Rupununi Pan. (C. M. Cat. No. 1521*a*; I. U. Cat. No. 11947.)

Two specimens, 43 and 52 mm. Chipoo Creek, a branch of the Ireng near Karakara. (C. M. Cat. No. 1522; I. U. Cat. No. 11948.)

Head 3 or a little less, depth at tip of occipital 5.5 in the length; width of head about an orbital diameter less than its length; interorbital about 2.5 in the length of the head; mandibular ramus 2.33–3 in the interorbital; D. 6; A. I,4; eye 5.5 in the head (in the largest specimen). About ten interopercular spines; naked part of the snout (in the largest specimen) extending one-fourth the distance to posterior margin of eye along the median line; three pairs of plates between the occiput and the dorsal, five plates between the dorsals, ten between the last anal ray and the caudal, and twenty-three along the sides.

Head finely granular, granules of posterior part of occipital arranged in faint radiating rows; plates of the sides with series of spines; last dorsal ray extending to the spine of the adipose; length of base of dorsal equal to its distance from the middle of the spine of the adipose dorsal; dorsal spine an orbital diameter or less shorter than the head; lower caudal rays equal to length of head. Ventrals rounded, reaching to middle of anal; pectoral to third fifth of ventrals.

General effect dark. Numerous light spots about as large as the pupil, smaller below, the spots of the back sometimes confluent, in rows. Dorsal with three to five wavy cross-bands; caudal spotted with dark, other fins with cross-spots. Dorsal and caudal sometimes margined with light.

The color of the specimens in the Leiden Museum is uniformly dark. The same is true of the specimen in Berlin collected by Schomburgk in Guiana. As the latter is in rather bad condition I am not prepared to say whether it belongs to the present species or the next.

105. **Ancistrus cirrhosus** (Cuvier and Valenciennes).

Hypostomus cirrhosus Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 511 (Rio Janeiro; Buenos Ayres).—Valenciennes, in d'Orbigny, Voy. Am. Mer., V, ii, 1847, pl. 7, fig. 3.

Ancistrus cirrhosus Kner, Denkschr. Akad. Wiss. Wien, VII, 1854, 272 (Rio Guaporé).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), II, 1889,

48; Occasional Papers Cal. Acad. Sci., I, 1890, 446 (Cudajas; Obidos); Proc. U. S. Nat. Mus., XIV, 1891, 43.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 411.

Chætostomus cirrhosus Günther, Catalogue, V, 1864, 247 (Essequibo, British Guiana).—Hensel, Archiv für Naturg., I, 1870, 76 (stony mountain streams).—Vaillant, Bull. Soc. Philom., (7), IV, 1880, 155 (Calderon).—Steindachner, "Flussfische Südamerika's," iv, 1882, 7 (Rio Huallaga).—Perugia, Ann. Mus. Genova, (2), XVIII, 1897, 21 (Rio Beni).

Xenocara cirrhosa Regan, Trans. Zool. Soc. London, XVII, 1904, 256 (Rio Paraguay; Amazon; Guiana; Trinidad).

Chætostomus variolus Cope, Proc. Acad. Nat. Sci. Phila., 1871, 288 (Ambyiacu).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), II, 1889, 64; Occasional Papers Cal. Acad. Sci., I, 1890, 442.

Three specimens, 48 to about 100 mm. Ireng River near Holmia. (C. M. Cat. No. 1523; I. U. Cat. No. 11949.)

Head 2.85–3; depth at tip of occipital 2.4 in the head; width of head an orbital diameter less than its length; interorbital 2.4 in the head; mandibular ramus 2–3 in the interorbital; D. I,7; A. I,4; eye 5.5 in the head in the largest specimen; about twelve interopercular spines, the longest 4.5 in the head.

Tentacles numerous, the naked area reaching half-way to the posterior margin of the eye in the largest specimen, which is a male; six plates between the dorsals, ten between the anal and caudal, and twenty-four along the sides.

Last dorsal ray scarcely reaching the spine of the adipose; base of dorsal a little greater than its distance from the adipose; dorsal spine equal to snout and eye; ventrals about reaching middle of anal; pectoral spine reaching third fifth of ventrals.

Black, with faint white spots; dorsal and caudal with dark spots along the rays; pectorals and ventrals spotted or plain.

106. Ancistrus hoplogenys (Günther).

Chætostomus hoplogenys Günther, Catalogue, V, 1864, 247 (River Capin, Pará).

Ancistrus hoplogenys Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), II, 1889, 48; Occasional Papers Cal. Acad. Sci., I, 1890, 448 (Tajapuru); Proc. U. S. Nat. Mus., XIV, 1891, 43.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 411.

Xenocara hoplogenys Regan, Trans. Zool. Soc. London, XVII, 1904, 255 (Guiana; Amazon; Rio Paraguay).

Chætostomus leucostictus Günther, Catalogue, V, 1864, 248 (Essequibo).—Steindachner, "Flussfische Südamerika's," iv, 1882, 7 (Rio Huallaga).

Ancistrus leucostictus Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., I, 1890, 447 (Coary; Tabatinga; Jutahy); Proc. U. S. Nat. Mus., XIV, 1891, 43.

Chætostomus alga Cope, Proc. Acad. Nat. Sci. Phila., 1871, 287, pl. 15, fig. 3 (Ambyiacu).

Chætostomus malacops Cope, Proc. Acad. Nat. Sci. Phila., 1871, 287, pl. 5, fig. 2 (Ambyiacu).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), II. 1889, 46; Occasional Papers Cal. Acad. Sci., I, 1890, 443; Proc. U. S. Nat. Mus., XIV, 1891, 43.

Chætostomus tectirostris Cope, Proc. Acad. Nat. Sci. Phila., 1871, 288, pl. 15, fig. 2 (Ambyiacu).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), II, 1889, 46; Occasional Papers Cal. Acad. Sci., I, 1890, 442; Proc. U. S. Nat. Mus., XIV, 1891, 43.

One specimen, 63 mm. Gluck Island. (C. M. Cat. No. 1517.)

Nine specimens, 50–108 mm. Packeoo Falls, Essequibo. (C. M. Cat. No. 1518*a–c*; I. U. Cat. No. 11944.)

Eighteen specimens, 63–119 mm. Rupununi Pan. (C. M. Cat. No. 1519*a–d*; I. U. Cat. No. 11945.)

Head 2.8; depth at tip of occipital 5–5.2 in the length; width of head an orbital diameter or less than an orbital diameter smaller than its length; interorbital 2.25 in the length of the head; mandibular ramus 2.75–3.75 in the interorbital; D. I,7; A. I,4; eye 5–6 in the head. About nine interopercular spines, hooked at the tip, the longest in the largest specimen 2.66 in the interorbital.

Tentacles rather small, the naked area in the largest male with four bifid tentacles; naked area extending one-fourth the distance to the posterior margin of the eye; seven plates between the dorsals, eleven between the anal fin and the caudal plates, and twenty-five along the sides. Last dorsal ray reaching to, or beyond, origin of spine of the adipose; base of the dorsal equal to the distance from the base of the last ray to the tip of the spine of the adipose; dorsal spine equal to snout and orbit; lower caudal ray much longer than the upper, equal to the length of the head. Ventrals rounded, reaching the middle of the anal; pectoral spine reaching the third fifth of the ventrals.

Black, with a few minute white spots everywhere; dorsal and caudal scarcely or not margined with lighter.

107. **Ancistrus lithurgicus** sp. nov.[26] (Plate XXV, fig. 3.)

Ancistrus lithurgicus EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 411 (name only).

Type, 95 mm. Crab Falls. (Carnegie Museum Catalog of Fishes No. 1524.)

Cotypes, fifteen specimens, 31–88 mm. Crab Falls. (C. M. Cat. No. 1525*a–d*; I. U. Cat. No. 11950.)

Head 2.8; much depressed; depth at tip of occipital process 6.8 in the length; width of head an orbital diameter less than its length; interorbital 2.8–3 in the

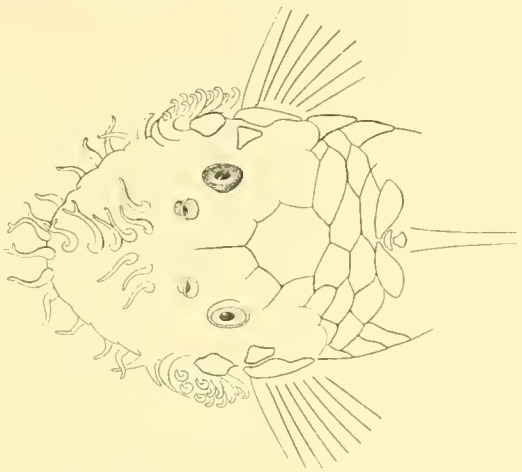

FIG. 36. *Ancistrus lithurgicus* Eigenmann. *Type*. C. M. Cat. No. 1524.

head; mandibular ramus 2–2.4 in the interorbital; D. I,7; A. I,4; eye 6 in the head in the largest specimen. Ten to twelve spines on the opercle, the longest 1.6 in the interorbital.

Tentacles profuse, the naked area of the snout in the male reaching half-way to the posterior margin of the eye; five or six plates between the dorsals, eleven behind the anal, and twenty-three or twenty-four along the sides.

Last dorsal ray reaching adipose; base of dorsal about equal to its distance from the tip of the adipose; dorsal spine equal to snout and orbit; lower dorsal ray an orbital diameter less than the head.

Black; a few minute white dots on back and fins, more numerous on belly, sometimes quite obscure; all fins black, the dorsal and caudal margined with white or yellow.

Allied to *A. hoplogenys*, but much more depressed.

[26] *Acanthicus*, another genus of this subfamily, is represented in the Rio Branco basin of Guiana by *Acanthicus hystrix* Spix.

LITHOXUS gen. nov.

Lithoxus EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 412 (name only).

Very much depressed, broad; lower surface flat, naked; preopercle with a bunch of spines, curved at the tip, the longest about equal to the orbit; snout more or less flexible, but covered with granular plates to its margin; premaxillaries not united, very short, with about two or three teeth on each side; mandibular ramus much wider, with seven to ten teeth on each side; pectorals in the male prolonged and densely covered with flexible spines along outer margin. Alimentary canal a little more than twice the total length.

Allied to *Pseudacanthicus*, the species small,[27] much depressed.

108. **Lithoxus lithoides** sp. nov. (Plate XXIX, figs. 1–4.)

Lithoxus lithoides EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 412 (name only).

Type, a male, 86 mm. Amatuk. (Carnegie Museum Catalog of Fishes No. 1527.)

Cotypes, eighty-six specimens, 25–85 mm. Amatuk. (C. M. Cat. No. 1528*a–j*; I. U. Cat. No. 11951.)

Seventy-two specimens, 25–61 mm. Warraputa. (C. M. Cat. No. 1529*a–j*; I. U. Cat. No. 11952.)

Seven specimens, 30–57 mm. Konawaruk. (C. M. Cat. No. 1530*a–b*; I. U. Cat. No. 11953.)

Thirteen specimens, 18–52 mm. Crab Falls. (C. M. Cat. No. 1531*a–c*; I. U. Cat. No. 11954.)

Three specimens, 43 mm. Waratuk. (C. M. Cat. No. 1532*a*; I. U. Cat. No. 11955.)

Head 3.2; depth 10; D. I,7; A. I,3 or I,4; V. I,5; P. I,6; width of head an orbital diameter less than its length; interorbital 3.5–4 in the head; eye 3–3.5 in snout, 6–6.5 in the head; mandibular ramus 2.5 in interorbital; five plates between the dorsals, ten behind the anal, twenty-three along the sides.

Head without keels; occipital bordered by three plates behind; two or three plates between the occipital and a small V-shaped plate in front of the dorsal; plates of the body without keels. A circular oral disk, largely covered with warts. Caudal peduncle flat below. A groove between the dorsals. Entire region in front of the anal naked. Origin of dorsal about equidistant from the snout and the tip

[27] A female 63 mm. long contains eggs about 2 mm. in diameter.

of the spine of the adipose; adipose fin long, the membrane extending to near the caudal; caudal obliquely truncate, the lower lobe much the longer, equal to snout and orbit or longer; anal minute; ventrals rounded, reaching middle of anal or a little farther; pectorals reaching to second third of ventral spine in the female, to near its tip in the male.

Mottled, either sand-color or quite black. All the fins more or less barred.

Abundant, clinging to the rocks in the rapids. Secured with "Hiari," which caused them to come to the surface.

Subfamily Loricariinæ.

Loricaria Linnæus.

Loricaria Linnæus, Systema Naturæ, ed. 10, I, 1758, 307.—Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 80 (*dura*).

Pseudohemiodon Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 81 (*platycephalus*).

Type, *Loricaria dura* Linnæus = *Loricaria cataphracta* Linnæus.

Readily distinguished from the other Loricariids by its tentacled lips.

109. Loricaria cataphracta Linnæus.

Loricaria dura (*ex* Linnæus, Mus. Adolphi Fred., 1754, 79, pl. 29, figs. 1 and 2) Bleeker, "Silures de Suriname," 1864, 18 (Surinam).

Loricaria cataphracta Linnæus, Systema Naturæ, ed. 10, I, 1758, 307; ed. 12, I, 1766, 508 (America).—Bloch, Ausl. Fische, VIII, 1795, 76, pl. 75, figs. 3, 4.—Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 459 (Surinam, Cayenne).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 631 (Rupununi).—Kner, Denkschr. Akad. Wiss. Wien, VI, 1853, 77 (Cujabá, Guaporé).—Günther, Catalogue, V, 1864, 255 (Surinam).—Peters, MB. Akad. Wiss. Berlin, 1877, 471 (Calabozo).—Cope, Proc. Am. Philos. Soc., XVII, 1878, 681 (Marañon, Peru).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), II, 1889, 36 (Vigia; São Gonçallo; Cameta; Manaos; Pará; Rio Negro; Coary; Villa Bella; Gurupa; Rio Preto; Tajapurú; Porto do Moz; Teffé, Marañon; Ucayale; Obidos).—Pellegrin, Bull. Mus. d'Hist. Nat., V, 1899, 158 (Apuré), 405 (Manaos).—Eigenmann and Bean, Proc. U. S. Nat. Mus., XXXI, 1907, 665 (Amazon).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 415.

Loricaria cirrhosa Bloch and Schneider, Syst. Ichth., 1801, 125, pl. 34.

Loricaria setifera Lacépède, Hist. Nat. Poiss., V, 1803, 140 (South America).

Plecostomus flagellaris Gronow, Cat. Fish, ed. Gray, 1854, 158.

Loricaria dura Bleeker, "Silures de Suriname," 1864, 18.

One specimen, 119 mm. Creek in Mora Passage. (C. M. Cat. No. 1503.)

One specimen, 112 mm. Mud-flats, Demerara. (I. U. Cat. No. 11938.)

One specimen, 85 mm. Crab Falls. (C. M. Cat. No. 1516.)

Head 5, width of head 1.5 in its length; eye 6 in the head, equal to interorbital; snout a little more than 2 in the head; width of first anal ray 2.6 in its distance from the caudal; scutes 8 + 15, the keels remaining distinct to the caudal.

Occipital with two keels ending in rather strong spines behind; two nuchal plates keeled, other plates in front of the dorsal keeled. Eye with a shallow notch. Lower surface of head naked.

Three long graduated teeth on each side of the upper jaw, seven much smaller ones on each side of the lower jaw. Lips with short warts about the mouth, otherwise with numerous long tentacles; free portion of the barbels much longer than the eye.

Anal plate in the largest specimen composed of four plates, ventral buckler of about seventeen plates imperfectly joined. Three to eight plates between the lateral plates, depending on the position.

Pectorals slightly emarginate, reaching past origin of ventrals; outer ventral ray prolonged, reaching to or beyond origin of last anal ray. Anal obliquely rounded. Upper caudal ray greatly prolonged, 180 mm. in length in a specimen 109 mm. long to base of caudal. Upper surface and fins reddish brown, caudal filament banded.

Loricariichthys Bleeker.

Loricariichthys Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 80 (*maculatus*).

Parahemiodon Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 80.

Rineloricaria Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 81 (*lima*).

Type, *Loricaria maculata* Bloch.

Distinguished from *Loricaria* by its papillose lips.

Key to the Guiana Species of Loricariichthys.

a. Upper lip interrupted in the middle. A single series of plates between the lateral series of the belly; teeth very minute, twenty or more on each side of the lower jaw; ventral buckler formed of six plates; pectorals truncate. (*Loricariichthys.*) ..... **microdon.**

aa. Upper lip well-developed. Two or more series of plates between the lateral plates of the belly; teeth twelve or fewer on each side of the lower jaw; ventral buckler formed of seven to sixteen plates. (*Rineloricaria.*)

b. No keels on head or on the plates in front of the dorsal; usually two series of plates between the lateral series on the middle of the belly; sand-color, lower surface plain..... **griseus.**

bb. Keels of the plates in front of the dorsal more or less evident; three or more series of plates between the lateral plates of the belly; a dusky area or spot on either side of base of first anal ray.

c. Head smooth; pores of the head black; plates of the middle of the belly frequently forming transverse scutes with the lateral plates.

d. Pectorals, ventrals and anal spotted; an ocellus-like spot on the back in front of the dorsal; pores of anterior part of body not black.....brunneus.

dd. Pectoral, ventrals and anal with a submarginal band..... platyurus.

cc. Head strigilate.....stewarti.

110. **Loricariichthys microdon** (Eigenmann). (Plate XXX, fig. 1; Plate XXXII, fig. 1.)

Loricaria acuta (not of Cuvier and Valenciennes) Müller and Troschel, in Schomburgk, Reisen, III, 1848, 631 (sand-bars of the Rupununi).

Loricaria microdon Eigenmann, Ann. Carnegie Mus., VI, 1910, 7; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 414.

This species is closely allied to, if not identical with, *L. acutus*. Regan gives the lower lip of *acutus* as entire.

I have examined the specimen mentioned by Müller and Troschel.

Type, 90 mm. Rupununi. (Carnegie Museum Catalog of Fishes No. 1507.)

Cotypes, two specimens, 76 and 112 mm. to tip of middle caudal ray. Rupununi. (I. U. Cat. No. 11942.)

Head 4–4.6; width of head 1.5–1.66 in its length; eye 6, equal to interorbital; snout 2+ in the head; width at first anal ray 5.33–6.33 in its distance from the caudal; scutes 17 or 18 + 14, the keels remaining separate throughout; upper lip not developed in the middle, entire on the sides in the largest specimen, fringed in the type; lower lip notched in the middle, deeply concave on each side in the type; the barbel extending considerably beyond the widest part of the lip, its free portion equal to the eye. Margin of the lower lip notched. Lips smooth. Lower lip in the largest specimen damaged, apparently reaching to the gill-opening, with a marginal fringe of tentacles.

Teeth excessively minute, twenty or more on each side of the lower jaw; about eight conical teeth on each side of the upper jaw.

Plates in front of the fourth dorsal ray keeled, a pair of keels on the occipital; eyes with large angular notches, which encroach on the interorbital in the largest specimen. Anal plate pointed in front, bordered by two or three plates, the three together united into a larger plate in the largest specimen; ventral buckler formed of six plates, apparently only four in the largest; a single series of plates between the lateral series, two or more series farther forward. Ventral armature reaching to the gill-opening; lower surface of head naked.

Pectorals truncate, the spine not produced, scarcely reaching ventral; ventral

rounded or the rays graduate, reaching to or a little beyond the origin of the anal. Dorsal spine equal to distance from snout to upper angle of gill-opening.

Five or six cross-bands, the first extending down and forward from the third and fourth dorsal rays, the second being a large spot on the sides a little in front of the tip of the dorsal; dorsal spotted, most conspicuously so at its tip; pectorals dusky, or faintly spotted; ventrals a little lighter; anal hyaline; caudal faintly spotted, the tip of the lower lobe black. Upper caudal ray scarcely produced.

111. Loricariichthys griseus (Eigenmann). (Plate XXX, fig. 2; Plate XXXII, fig. 2.)

Loricaria griseus Eigenmann, Ann. Carnegie Mus., VII, 1910, 8; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 414.

Type, 131 mm. over all, 118 to tip of middle caudal rays. Konawaruk. (Carnegie Museum Catalog of Fishes No. 1504.)

Cotypes, eleven specimens, 36–108 mm. to base of middle caudal ray. Konawaruk. (C. M. Cat. No. 1505*a–c*; I. U. Cat. No. 11926.)

Cotypes, twenty-two specimens, 49–119 mm. to base of middle caudal ray. Bartica sand-bank. (C. M. Cat. No. 1506*a–c*; I. U. Cat. No. 11927.)

Allied to *L. punctatus* and *L. maculatus*.

Head 4.5–5; width of head 1.4–1.5 in its length; eye 5; interorbital 6.5–7; snout 2 in the head; width at first anal ray 5–5.33 in its distance from the caudal; scutes 18 or 19 + 11, the lateral keels remaining separate throughout.

Upper lip well-developed, thickly papillose in the types, and always margined with well-developed tentacles, which are shortest, or absent, at the center. Lower lip in the type very broad, extending to the middle of the opercle, everywhere minutely warty, with a few larger warts on its anterior half, emarginate, otherwise with the edge smooth; lips ordinarily much narrower, not much wider than the part with larger warts, deeply emarginate, and the edge with minute tentacles; free portion of the barbel scarcely half the length of the eye.

Teeth minute, about six to eight on each side of the upper jaw and twelve on each side of the lower, those of the upper jaw much smaller than the largest of the lower jaw.

Head without ridges, an obscure groove on the occipital, sometimes continued in the first or first two nuchal plates; orbital notch broad and shallow, rounded, not encroaching on the interorbital; lower surface of the head naked; plates of the body without keels or ridges; anal plate normally bordered by three plates, but sometimes by four or five; two to four series of plates between the lateral plates

of the belly; anterior border of the ventral armature on a line with the gill-openings, truncate or emarginate through the development of minute plates on the side in front.

Pectoral truncate when half expanded, emarginate when depressed, the spine not prolonged, reaching second fourth of the ventrals. Ventrals usually rounded or truncate, scarcely reaching the anal; in a few of the Bartica specimens the inner rays are prolonged, reaching to near the fourth anal ray; upper caudal ray in a well-preserved specimen 2.5 times the length of the middle ray.

Sand-colored, with the back everywhere spotted; very obscure cross-bars; dorsal, pectoral, and more obscurely the ventral colored like the back; upper part of caudal with cross-bars, tip of lower caudal lobe blackish; anal hyaline.

112. **Loricariichthys brunneus** (Hancock). (Plate XXX, fig. 3; Plate XXXI, fig. 4.)

Loricaria brunnea Hancock, Zool. Journ., IV, 1828, 247 (Demerara).—Cuvier and Valenciennes, Hist. Nat. Poiss., XV, 1840, 479 (copied).—Günther, Catalogue, V, 1864, 260 (copied).—Eigenmann and Eigenmann, Occasional Papers Cal. Acad. Sci., I, 1890, 370.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 415.

Hancock's species of *Loricaria* from Demerara described as having a single series of plates along the ventral surface is undoubtedly the common *Loricaria* of that locality. There are several (about three) series of plates between the lateral plates of the belly, but these are so united and attached to the lateral series that they give the impression of a continuous plate extending entirely across the belly.

Twelve specimens, 68–136 mm. to end of shortest caudal ray. Lama Stop-Off. (C. M. Cat. No. 1491*a–d*; I. U. Cat. No. 11928.)

Seven specimens, 60–124 mm. Maduni Creek. (C. M. Cat. No. 1492*a–b*; I. U. Cat. No. 11929.)

One specimen, 90 mm. Botanic Garden. (C. M. Cat. No. 1493*a*.)

Six specimens, 68–110 mm. Demerara River below Wismar. (C. M. Cat. No. 1494*a–b*; I. U. Cat. No. 11930.)

Two specimens, 76–105 mm. Christianburg Canal. (C. M. Cat. No. 1495*a*; I. U. Cat. No. 11931.)

One specimen, 108 mm. Wismar. (C. M. Cat. No. 1496*a*.)

Two specimens, 77–118 mm. Kumaka, Demerara. (C. M. Cat. No. 1497*a*; I. U. Cat. No. 11932.)

Two specimens, 103–112 mm. Malali. (C. M. Cat. No. 1498*a*; I. U. Cat. No. 11933.)

Twenty-four specimens, 73–151 mm. Gluck Island. (C. M. Cat. No. 1499*a–e*; I. U. Cat. No. 11934.)

Eight specimens, 67–183 mm. Rockstone. (C. M. Cat. No. 1500*a*; I. U. Cat. No. 11935.)

Four specimens, 77–135 mm. Tumatumari. (C. M. Cat. No. 1501*a*; I. U. Cat. No. 11936.)

Six specimens. Rupununi. (C. M. Cat. No. 1502*a–b*; I. U. Cat. No. 11937.)

Head 5.33–5.5; width of head 1.4–1.66 in its length; eye 6–6.5 in the head, interorbital 4.33, snout 2; width at first anal ray 4.5–5.33 in the distance of the anal from the caudal; scutes 18 + 13 to 16 + 15, the keels entirely united on the posterior scutes.

Lips papillose, their margins fringed, more in the young, less in the adult; free part of barbel equal to eye. Head and scutes without keels. Seven to ten teeth on each side of the upper jaw, seven to nine on each side of the lower.

Lower surface of head naked; a narrow orbital notch.

Anal plate bordered by three plates; eleven to sixteen plates in the ventral buckler; three series of plates between the lateral series, which in the posterior part of the belly are frequently so united as to form a transverse scute; middle plate sometimes more distinct. Armature developed to between the anterior angle of the gill-opening.

Pectoral truncate, the outer ray sometimes slightly produced, reaching about to origin of ventrals. Outer ventral ray sometimes produced, reaching to base of first or beyond base of last anal ray. Dorsal spine a little longer than the head; caudal lunate, the upper ray much, and the lower sometimes less, produced.

Pores of the head black; a dark spot in front of the dorsal, not quite equal to the eye, margined by a lighter one, and this flanked by a dark streak on each side, having the appearance of an obscure ocellus, becoming very obscure in the largest specimen. Dorsal surface marbled, four or five dark bands behind the dorsal, evident even in the largest specimens. Fins spotted, tip of caudal blackish, the latter with cross-bars, a basal and submarginal bar in the largest, and several in the smaller, in which the caudal is much darker, sometimes nearly black; a small dark spot on either side of the base of the first anal ray.

113. **Loricariichthys platyurus** (Müller and Troschel). (Plate XXX, fig. 4; Plate XXXI, fig. 3.)

Loricaria platyura Müller and Troschel, in Schomburgk, Reisen, III, 1848, 631 (Rupununi).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 415.

Loricaria submarginata EIGENMANN, Ann. Carnegie Mus., VI, 1910, 10; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 414.

One specimen, 142 mm. over all, 92 mm. to tip of middle caudal rays. Creek below Potaro Landing. (C. M. Cat. No. 1510.)

Closely allied to *L. brunneus*. An examination of the type of *L. platyurus* in Berlin leaves no doubt about the identity of the species.

Head very little less than 5 in the length; width of head 1.5 in its length; eye 5.5, interorbital 4, snout 2 in the head; width of first anal ray 5 in its distance from the caudal; scutes 12 + 15, the lateral ridges almost completely united on the last seven scutes.

Lips well-developed, with a marginal series of fringes, interrupted in the middle in front, and with rather long warts. Lips not nearly reaching gill-opening. Seven or eight teeth in each side of each jaw. Free portion of the barbel about equal to the eye.

Head without ridges, plates in front of the dorsal but faintly keeled. Orbital not shallow, narrowly rounded.

Anal plate bordered by three plates in front, the ventral buckler formed of seven to thirteen plates; about three series of plates between the lateral plates, these with the lateral plates forming in the posterior part regular transverse scutes, the scutes becoming more numerous and less regular in front. Armature truncate in front, not extending quite to the anterior angle of the gill-opening.

Pectorals slightly emarginate, the inner angle rounded, extending to the origin or second fourth of the ventrals; ventral rays graduated, the outer ray scarcely prolonged, reaching to the base of the last anal ray.

Pores of the head and to below the dorsal jet-black; obscure cross-bands, that below the base of the dorsal and that below its tip most prominent. No ocellus in front of dorsal. Dorsal spotted, the submarginal spots most prominent. Pectoral, ventral, and anal each with a broad submarginal dark band; base of caudal and the tips, exclusive of the upper ray, black. Upper caudal ray much prolonged, forming 51 mm. of the total length.

114. **Loricariichthys stewarti** (Eigenmann). (Plate XXX, fig. 5.)

Loricaria stewarti EIGENMANN, Ann. Carnegie Mus., VI, 1910, 9; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 414. Allied to *L. teffeanus* and *L. konopickyi*.

Type, 81 mm. over all, 64 mm. to tip of middle caudal ray. Chipoo Creek, a tributary of the Ireng. (Carnegie Museum Catalog of Fishes No. 1508.)

Cotypes, eleven specimens, 52–68 mm. to tip of middle caudal rays. Chipoo Creek. (C. M. Cat. No. 1509*a–c*; I. U. Cat. No. 11943.)

Allied to *L. brunneus*, the head strigilate.

Head 5; width of head 1.5 in its length; eye 6, interorbital 4.5, snout 2.2 in the head; width at first anal ray 5.33–5.66 in its distance from the caudal; scutes 17 + 13 to 14 + 15, the lateral keels nearly merged behind.

Upper lip with a marginal fringe of tentacles; lower lip papillose, except near the margin, with a marginal series of tentacles, which do not extend to the gill-opening.

About six teeth in each side of the upper jaw and eight on each side of the lower.

Head and body strigilate; lateral keels weak, other scutes (except nuchal scutes) not carinate; occipital with a pair of slightly diverging keels, the two following nuchal plates each with a pair of keels.

Orbital notch narrow and deep, eye nearly circular. Lower surface of the head naked, except for a narrow entering triangle in front of the gill-opening.

Anal plate margined by three large plates, the anal buckler composed of eleven plates; posteriorly three, anteriorly five, series of plates between the lateral series. Ventral armature fully developed (even in the smallest individuals) to between the anterior angle of the gill-openings.

Dorsal spine about equal to the head. Pectorals truncate, reaching ventrals. Ventrals rounded, or the outer ray slightly produced, reaching the anal. Upper caudal ray forming considerably more than a third of the total length.

Dark, with the usual cross-bars; pores black, but not conspicuous. Dorsal rays spotted, a large spot near the tip of the three first rays. Pectorals, ventrals, and anal barred, the bars most evident on the first rays. Base and margin of caudal black, the outer rays barred.

Hemiodontichthys Bleeker.

Hemiodontichthys Bleeker, Nederl. Tijdschr. Dierk., I, 1863, 81.

Type, *Hemiodon acipenserinus* Kner.

Intermediate in shape between *Loricaria* and *Farlowella*, the snout produced and expanded at the tip, and having numerous small recurved spines.

115. Hemiodontichthys acipenserinus (Kner).

Hemiodon acipenserinus Kner, Denkschr. Akad. Wiss. Wien, VI, 1853, 92, pl. 7, fig. 2 (Rio Guaporé, Mattogrosso).

Loricaria acipenserina Günther, Catalogue, V, 1864, 260 (copied).—Vaillant, Bull. Soc. Philom., (7), IV, 1880, 159 (Calderon).

Hemiodontichthys acipenserinus Eigenmann and Eigenmann, Proc. Cal. Acad. Sci.,

(2), II, 1889, 34 (Manacapurú; Hyavary); Occasional Papers Cal. Acad. Sci., I, 1890, 359.—Regan, Trans. Zool. Soc. London, XVII, 1904, 296.—Eigenmann, Ann. Carnegie Mus., IV, 1907, 120, pl. 35, fig. 1 (Corumbá); Repts. Princeton Univ. Exp. Patagonia, III, 1910, 415.

One specimen, 95 mm. to tip of middle caudal rays, 118 over all. Gluck Island. (C. M. Cat. No. 1514.)

Head 3.25; width of head 2.2 in its length; eye 8 in head, 4.5 in snout; interorbital 6.5 in head. Width of first anal ray 5 in its distance from the caudal; scutes 11 + 16, the keels remaining separate. Head, and all the plates in front of the dorsal, with wavy longitudinal ridges. A deep inturned orbital notch.

Lips very broad, extending slightly beyond the anterior angle of the gill-opening, faintly papillose, the margin variously nicked and fringed. Teeth in the lower jaw very minute, none in the upper jaw. Anal plate bordered by three larger plates, the four forming the ventral buckler. A median series of three plates between the lateral series in front of the buckler.

Pectorals truncate, reaching ventrals; ventrals rounded, reaching anal; anal rounded. Dorsal spine equals head without snout. Caudal oblique, very faintly emarginate, the upper ray more than three times the length of the middle ray.

Upper surface reddish brown, sides of head and lips marbled, five bars across the back behind the dorsal. Fins faintly barred.

Harttia Steindachner.

Harttia Steindachner, "Süsswasserfische d. südöstlichen Brasilien," iii, 1876, 110 (*loricariiformis*).

Loricariiform; teeth numerous, in about equal numbers in both jaws; snout not produced into a rostrum.

116. **Harttia platystoma** (Günther). (Plate XXX, fig. 6; Plate XXXI, figs. 1–2.)

Loricaria platystoma Günther, Proc. Zool. Soc. London, 1868, 236, figs. 4, 5 (Surinam).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), II, 1889, 37; Occasional Papers Cal. Acad. Sci., I, 1890, 385; Proc. U. S. Nat. Mus., XIV, 1891, 39.

Oxyloricaria platystoma Regan, Trans. Zool. Soc. London, XVII, 1904, 298.

Harttia platystoma Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 415.

Twelve specimens, 53–160 mm. Rockstone. (C. M. Cat. No. 1511*a–c*; I. U. Cat. No. 11939.)

Four specimens, 53–114 mm. Konawaruk. (C. M. Cat. No. 1512*a*; I. U. Cat. No. 11940.)

Twenty specimens, 52–127 mm. Warraputa. (C. M. Cat. No. 1513*a–e*; I. U. Cat. No. 11941.)

Head 4.4–5; width of head 1.33 in its length; eye 6, interorbital 5, snout not quite 2 in the head; width of the first anal ray 4.25–4.5 in its distance from the caudal; scutes 19 + 10 to 17 + 12, the lateral keels very feeble in front of the middle of the ventrals, entirely united on about the last two scutes.

Lips narrow, papillose, with a very narrow fringe, free portion of the barbel about one-fourth the diameter of the eye.

Teeth very numerous in both upper and lower jaws.

Lower surface of the head naked, except for a triangular plate in front of the gill-openings. Head and scutes without keels of any sort; orbit without a notch.

A pair of anal plates; ventral buckler formed of about forty plates; eight to ten series of small plates between the lateral plates, becoming minute and isolated on breast and reaching to the gill-opening. The plates are only partially developed in specimens 100 mm. long.

Dorsal spine about 1.4 times as long as head; pectorals falcate, reaching past middle of ventrals in adult. Ventrals lanceolate, reaching past origin of anal, which is also lanceolate. Caudal deeply lunate, the middle rays two-fifths the length of the lowest and two-sevenths the length of the uppermost ray.

Back marbled; seven cross-bands, showing in the young only. Dorsal spotted, the anterior ray tending to uniform blackness. Upper surfaces of pectoral and ventral barred, most intensely in the outer rays; anal hyaline or faintly barred in front. *Lower* caudal lobe and a lunate spot on the middle of the caudal black, upper lobe barred.

FARLOWELLA Eigenmann and Eigenmann.

Acestra (not of Dallas, 1852) KNER, Denkschr. Akad. Wiss. Wien, 1853, 93.

Farlowella EIGENMANN and EIGENMANN, Proc. Cal. Acad. Sci., I, 1890, 355 (*acus*).

Type, *Acestra acus* Kner.

Loricariiform; body narrow, snout slender, prolonged into a long rostrum; dorsal in part over ventrals.

117. **Farlowella hargreavesi** sp. nov. (Plate XXXII, fig. 3.)

Type, a single specimen, 65 mm. to base of caudal. Locality not given.

Head to end of temporal plate 3.75 in the length; its width not quite one-third its length; eye 12 in the head to end of the temporal plate; anterior margin of the

eye equidistant from tip of snout and anus; snout in front of the naked area about the mouth 3 in the distance to the anus; postorbital part of the head 3.5 in the snout. Distance from supraoccipital to the dorsal 6 in the length; snout long, slender, granular, expanded at the tip.

Seven plates between the supraoccipital and the dorsal; lateral plates thirty-three (14 + 19).

Much faded, but outer margins of caudal evidently dark.

Named for Mr. T. Sydney Hargreaves, author of "The Fishes of Guiana," who presented the specimen to the Museum of Georgetown.

Order **HETEROGNATHI.**

Family CHARACIDÆ.

= *Characini* Müller, Archiv für Naturg., IX, i, 1843, 323.
= *Characinidæ* Richardson, Encycl. Brit., ed. 8, XII, 1856, 245.
> *Characidæ* Gill, Mem. Nat. Acad. Sci., VI, 1893, 131.

This large family includes fishes of nearly all shapes and sizes, and inhabiting all sorts of fresh-waters in tropical South America. The species found in Guiana are distinguished from the other fishes of that country by the presence of scales, a short dorsal fin without spines, and a short adipose dorsal fin. The latter, however, is absent in *Hoplias*, *Erythrinus*, *Carnegiella*, *Pœcilocharax*, and *Nannostomus*.

Key to the Guiana Genera of Characidæ.

a. Mouth protractile; no teeth; gills with forward-directed lamellæ. An adipose fin; upper jaw rudimentary, lower jaw large, well-developed. (*Bivibranchiinæ*.) ..... **Bivibranchia.**

aa. Mouth not protractile.

b. Teeth none; an adipose fin; lower jaw firm, with a thin edge; intestine very long; gill-rakers none or modified. (*Curimatinæ*.)

c. Lateral line incomplete; caudal naked; tongue long, narrow; mouth very oblique, cyprinodontiform. **Curimatopsis.**

cc. Ventral surface not spiniferous; lateral line complete; tongue broad, adnate; mouth terminal or inferior.

d. Caudal lobes densely scaled. ..... **Curimatella.**

dd. Caudal lobes naked. ..... **Curimatus.**

(*ccc*. Post-ventral surface trenchant, spiniferous; predorsal area scaled. ..... **Psectrogaster.**)

bb. Teeth minute on the margins of fleshy lips, movable; gill-membranes joined to the isthmus. (*Cf. bbb*.)

c. Gills normal; mouth large, evertible to form a circular sucking disk; teeth numerous on both lips, in single series on the sides, in two in the middle; a predorsal spine; scales rough; species of large size. (*Prochilodinæ*.) ..... **Prochilodus.**

cc. Fourth gill-arch dilated behind, its surface with corrugations which fit into similar ones on the concave fifth arch; mouth small; no predorsal spine; species small. (*Chilodinæ*.)

f. Anal emarginate, the highest rays extending beyond the tip of the last; scales with serrate margins; feeble teeth in both jaws, those of the upper jaw bifid. ..... **Tylobronchus.**

ff. Anal truncate, the highest ray not reaching the base of the last; scales entire; teeth in both jaws entire. ..... **Chilodus.**

bbb. Teeth on the lower jaw none, or else confined to the sides of the jaw; gill-arches normal; jaws firm. (*Cf. bbbb.*) (*Hemiodontinæ.*)

g. No fontanel; teeth of the upper jaw pectinate, directed backward, their margins in a straight transverse line, teeth of the lower jaw confined to the sides..... **Parodon.**

gg. Large fontanels; teeth in the upper jaw in a crescent, none in the lower jaw.

h. Scales below the lateral line of the same size as those above it..... **Hemiodus.**

hh. Scales below the lateral line larger than those above it..... **Anisitsia.**

bbbb. Teeth well-developed in both jaws, fixed.

i. Caudal forked (*Cf. Hydrolicus*).

j. Teeth truncate, notched, or denticulate; or, if conical, the species small, and without an adipose fin.

k. Teeth conical; no adipose fin; no fontanel; mouth short, oblique, cyprinodontiform; two series of teeth in the lower jaw. (*Pyrrhulininæ.*)

l. Premaxillary with two series of teeth..... **Pyrrhulina.**

kk. Not as under *k*.

m. Ventral edge without serræ.

n. Preventral area not expanded; pectorals small.

o. Premaxillary and dentary each with a single series of teeth.

p. No frontal fontanel, posterior fontanel, if present, minute; adipose fin present or not. (*Nannostomatinæ.*)

q. Skull truncate; no occipital process; no fontanel; teeth usually incisor-like, notched at tips; no lateral line.

r. No adipose fin; teeth broad at tip, with five equal points. **Nannostomus.**

rr. Adipose fin well-developed.

s. Pectorals normal; teeth with five equal or subequal points..... **Pœcilobrycon.**

ss. Pectorals fleshy flaps, edged with filaments; teeth three- to five-pointed, the middle point much the longer. **Archicheir.**

qq. A triangular occipital process; a small circular occipital fontanel; adipose fin well-developed; lateral line complete; teeth usually three-pronged..... **Characidium.**

pp. A large frontal and (usually) a parietal fontanel.

t. Gill-membranes united, usually joined to the isthmus; mouth small, with little or no antero-posterior extent. (*Anostomatinæ.*)

u. Teeth of the upper jaw serrate or multicuspid.

v. Snout elongate, subcircular in cross-section; mouth minute, vertical; gill-membranes joined to the isthmus. ..... **Anostomus.**

vv. Snout elliptical in cross-section, not produced; the mouth terminal..... **Schizodon.**

uu. Teeth of the upper jaw serrate in young, truncate in adult; mouth directed obliquely upward... **Schizodontopsis.**

uuu. Teeth in both jaws obliquely truncate, directed obliquely forward toward a median point.....**Leporinus.**

tt. Gill-membranes free from the isthmus and from each other.

w. Dorsal with fifteen rays. (*Crenuchinæ.*)

x. An adipose fin; mouth large, maxillary extending to below middle of eye.....**Crenuchus.**

xx. No adipose fin; mouth small, maxillary extending to below anterior margin of eye.....**Pœcilocharax.**

ww. Dorsal short. (*Aphyocharacinæ.*)

y. Lateral line complete; maxillary with a few teeth. **Odontostilbe.**

yy. Lateral line incomplete.

z. Caudal naked; teeth pointed, with a notch on each side.....**Aphyocharax.**

zz. Caudal scaled.....**Aphyodite.**

oo. Premaxillary with two or more series of notched teeth. (See *A.*)

A. Gill-membranes united, free from the isthmus. Dorsal entirely behind the ventrals, in part over the anal; teeth pluricuspid incisors, a single tooth in the front row of each premaxillary; mouth small. (*Iguanodectinæ.*)

B. Breast not compressed to an edge.....**Iguanodectes.**

BB. Breast compressed to an edge.....**Piabucus.**

AA. Gill-membranes free from each other and from the isthmus; opercle not prolonged.

C. No predorsal spine.

D. Preventral area with a median edge; pectorals small, placed low; anal basis nearly horizontal; mouth large, with canines. (*Agoniatinæ.*).....**Agoniates.**

DD. Preventral area rounded, sometimes very narrow.

E. Lower jaw with a single series of teeth. (*Tetragonopterinæ.*)

F. Gill-rakers setiform.

G. Caudal scaled; anal with a basal sheath of scales.

H. Lateral line much decurved in front.....**Tetragonopterus.**

HH. Lateral line not greatly decurved, scales entire.

I. Lateral line complete; predorsal area with a median series of scales; five teeth in the inner series of the premaxillary; second suborbital not completely covering the cheek.....**Mœnkhausia.**

II. Lateral line incomplete; caudal lobes equal.

J. Maxillary with teeth along its entire margin.....**Pristella.**

JJ. Maxillary with few or no teeth.....**Hemigrammus.**

GG. Caudal naked.

K. Preventral area with several series of normal scales.

L. Lateral line incomplete. Maxillary border a simple curve; origin of anal behind origin of dorsal; scales cycloid.

M. Pectoral normal.....**Hyphessobrycon.**

MM. Pectoral archaic, a fleshy lobe surrounded by a fringe of filaments. **Dermatocheir.**

LL. Lateral line complete.

N. Maxillary border meeting premaxillary border at a right angle, its

margin then describing a quarter circle and continuing in a direction nearly parallel with that of the premaxillary.

Creatochanes.

NN. Anterior maxillary-premaxillary border forming a simple curve.

O. Teeth of the sides of the lower jaw abruptly smaller.

P. Premaxillary teeth in three series; anal of not more than fourteen rays. ..... **Creagrutus.**

PP. Premaxillary teeth in two series.

Q. Four teeth in the inner series of the upper jaw; second suborbital covering entire cheek... **Bryconamericus.**

QQ. Five teeth in the inner series of the lower jaw.

R. Scales cycloid.

S. Predorsal line scaled..... **Astyanax.**

SS. Predorsal line naked..... **Pœciluriehthys.**

RR. Scales ctenoid..... **Ctenobrycon.**

OO. Teeth of the sides of the lower jaw graduated..... **Deuterodon.**

KK. Preventral area with two series of large overlapping scales..... **Phenacogaster.**

(*FF*. Gill-rakers short, lanceolate..... **Scissor.**)[28]

EE. Lower jaw with two series of teeth, the inner series consisting of a pair of conical teeth within the outer series, and beginning at a greater or less distance from these a series of minute teeth on the sides. (*Bryconinæ*.)

T. Scales alike above and below.

U. No fontanels..... **Holobrycon.**

UU. Two large fontanels..... **Brycon.**

TT. Scales much larger above the lateral line..... **Chalceus.**

CC. A predorsal spine, scale-like; caudal scaled. (*Stethaprioninæ*.)..... **Fowlerina.**

nn. Preventral area compressed, trenchant, more or less expanded; pectorals large.

V. Body elongate, lateral line continued to the tail. (*Chalcininæ*.)

Chalcinus.

VV. Body short; the lateral line deflected to before the anal; sternum much expanded; skull with longitudinal crests. (*Gasteropelecinæ*.)

W. No adipose fin; maxillary with a single, large, hooked tooth.

Carnegiella.

WW. Adipose fin present; maxillary with large, hooked teeth; premaxillary teeth in a single series..... **Gasteropelecus.**

mm. Belly and preventral area trenchant and serrate.

X. All teeth in the jaws in a single series. (*Serrasalminæ*.)

Y. A series of teeth on each side of the palate..... **Serrasalmo.**

YY. Palate without teeth.

Z. Teeth with simple cutting edge..... **Pygocentrus.**

ZZ. Teeth serrate..... **Pygopristes.**

XX. Premaxillary teeth in two series. (*Mylinæ*.)

α. Mandible with a single series of teeth.

β. Abdomen serrate before and behind the ventrals; premaxillary teeth conical; lower jaw much projecting..... **Catoprion.**

[28] The place from which *Scissor* came is not known.

$\beta\beta$. Abdomen serrate behind the ventrals only.

γ. Anal bilobed. ..... **Mylesinus.**

$\gamma\gamma$. Anal deeply emarginate. ..... **Acnodon.**

$\alpha\alpha$. Mandible with a pair of conical teeth, premaxillary teeth trenchant.

δ. Adipose fin long. ..... **Metynnis.**

$\delta\delta$. Adipose fin short, the two series of teeth of the upper jaw separated from each other. ..... **Myloplus.**

$\delta\delta\delta$. Adipose fin short; the two series of teeth of the upper jaw close together, teeth of the outer row forming a continuous series of incisors. **Myleus.**

jj. Teeth conical; gill-membranes free from the isthmus.

ϵ. Pectorals very large; belly compressed; body long and narrow. (*Cynodontinæ*.)

ζ. Abdominal area much shorter than anal basis; caudal lunate; ventrals small; pectorals reaching anal; anal with about eighty rays; dorsal over anal; scales cycloid. ..... **Cynodon.**

$\zeta\zeta$. Abdominal area much longer than anal basis; caudal rounded; pectorals overlapping ventrals; origin of ventrals about equidistant from origin of anal and upper angle of gill-opening; anal with about thirty-five rays; dorsal in front of anal; scales ctenoid. ..... **Hydrolicus.**

$\epsilon\epsilon$. Not as under ϵ.

η. No teeth on palate; snout not prolonged. (*Characinæ*.)

θ. Both jaws with antrorse, tooth-like structures.

ι. Anal short, of fewer than thirty rays, deeply emarginate, its origin behind the vertical from the last dorsal ray. Clavicle not notched to receive the base of the pectoral. ..... **Exodon.**

$\iota\iota$. Anal long, its origin in front of the vertical from the first dorsal ray, its margin straight; clavicle with a shallow notch to receive the base of the pectoral. ..... **Roeboides.**

$\theta\theta$. Jaws without antrorse, tooth-like processes.

κ. Preopercle without a spine; anal margin straight or nearly so.

λ. Scales forty to sixty in the lateral line; clavicle with a deep notch to receive the base of the pectoral, the lower part of the clavicles blade-like, sub-parallel ridges bounding the breast on either side and ending in a spine in front and behind; premaxillary and dentary with a canine at each end; two series of teeth between the canines of the premaxillary, and a single series between those of the mandible; anal very long, its origin in advance of the vertical from the first dorsal ray.

μ. Lateral line complete; pectoral overlapping the ventrals. **Charax.**

$\mu\mu$. Lateral line incomplete; pectoral archaic. ..... **Asiphonichthys.**

$\lambda\lambda$. Over ninety scales in the lateral line; clavicle with a notch; lower margins of the clavicles forming a much less prominent ridge than in *Charax*, without spines; origin of anal behind the vertical from the first dorsal; teeth as in *Charax*, but an additional and much larger median canine on the dentary. ..... **Cynopotamus.**

$\kappa\kappa$. Interopercle drawn out into a prominent spine; anal margin deeply concave; origin of anal behind the vertical from the origin of the dorsal.

ν. Premaxillary with a canine at each end and a double row of teeth between them; mandible with three or four canines in front; the last one much the largest. Maxillary with a canine at its upper end and pectinate teeth along its margin; clavicle notched, the lower angle of the notch produced, scale-like; cheeks partly naked. ..... **Acanthocharax.**

νν. Premaxillary teeth in a single series (rarely one or two teeth forming a second series); no canines at the ends of the series, but the anterior teeth graduated, the third tooth largest, canine-like; upper angle of maxillary without a canine, the teeth graduated in both directions from about the fifth tooth. Anterior teeth of the lower jaw canines, of which the first is large, the second very small, the teeth from the second to the sixth graduated, the sixth being about the size of the first; first teeth of the premaxillary graduated, the third tooth being the largest; clavicle not notched. ..... **Heterocharax.**

ηη. Teeth on palate; snout prolonged; body long, cylindrical or subcylindrical.

ξ. Snout moderate; some of the teeth canines; anal long. (*Acestrorhamphinæ*.) Maxillary with two canines, slipping under the preorbital for its entire length. ..... **Acestrorhynchus.**

ξξ. Snout very long, slender, with small, conical teeth; anal short. Lepisosteus-like. (*Hydrocyninæ*.) A single series of teeth in each jaw. **Hydrocynus.**

ii. Caudal rounded; mouth large, teeth conical, some of them canines. No fontanels; no adipose dorsal. (*Erythrininæ*.)

o. Walls of the air-bladder normal; maxillary with a canine anteriorly..... **Hoplias.**

oo. Walls of the anterior portion of the air-bladder cellular; maxillary without a canine.

π. Pterygoids with teeth; dorsal rounded..... **Hoplerythrinus.**

ππ. Pterygoids without teeth; dorsal fin angular or pointed..... **Erythrinus.**

Subfamily Bivibranchiinæ.

Bivibranchia gen. nov.

Mouth minute, with a row of movable multicuspid teeth in the fleshy upper lip, none in the lower lip; upper jaw pointed, freely protractile; nares separated by a flap only; gill-membranes narrowly joined to the isthmus at a point below the posterior margin of the eye; gills highly modified; gill-rakers on the anterior face of the anterior arch fleshy, dendritic, a shorter papilliform series on its posterior face, interlocking with the anterior rakers of the second arch; similar interlocking rakers between subsequent arches; broad lamellæ extending inward as the gill-filaments extend outward on each arch, the lamellæ with papillated ridges corresponding to the rakers, so that the ridges of succeeding lamellæ interlock.

Scales firm, cycloid. Lateral line complete, scarcely decurved; fins naked; anal very small; middle caudal rays with broad membranes; vertebræ 17 + 18

(not counting the coalesced vertebræ); adipose lid covering almost the entire eye; fontanels both large, the frontal fontanel becoming linear in front.

A series of valvular organs on the roof of the mouth; the first a cushion about as broad as long, with a transverse ridge in front and two blunt papillæ near its posterior edge, a blind pocket extending under it from behind; the second valve consisting of a pair of soft flaps on the sides of the roof of the mouth, extending obliquely downward and backward; the third a pair of triangular cushions, the point extending forward and the base extending backward, free; the fourth a transverse membrane with three pendant lobes in the middle; a pair of short papillated flaps between the third and fourth valves. No tongue; a series of slender papillæ across the floor of the mouth in front of the gills, and opposite the anterior margin of the triangular cushion; sides of the mouth in front of the gills with oblique series of papillæ. Two air-bladders, connected by a slender thread only, the anterior about as large as the eye, the posterior very delicate, large, straight, and conical, reaching to the anus, 2.5 in the length. Alimentary canal about equal to the length without the caudal, with eleven cœca; a highly muscular gizzard-like stomach with longitudinal ridges extending into the lumen. The alimentary canal contains much sand, which suggests trituration in the muscular stomach.

118. **Bivibranchia protractila** sp. nov. (Plate XXXIII, figs. 1–5.)

Type, 115 mm. Bartica sand-bank. (Carnegie Museum Catalog of Fishes No. 1873.)

Cotypes, eight specimens, 58–67 mm. Bartica sand-bank. (C. M. Cat. No. 1874*a–c*; I. U. Cat. No. 12158.)

Cotypes, eighteen specimens, 77–110 mm. Rockstone sand-bank. (C. M. Cat. No. 1875*a–c*; I. U. Cat. No. 12159.)

Cotypes, three specimens, 22–115 mm. Crab Falls. (C. M. Cat. No. 1876; I. U. Cat. No. 12243.)

Head 3.6; depth 4.6–5; D. 11; A. 9; scales 7 or 8—55 to 60—3 or 4; V. 11; P. 17; eye equals snout, 3.2 in the head, .8–1 in the interorbital.

Very similar to *Albula vulpes*. Dorsal and ventral profiles equal and gently arched; profile of head slightly arched, the head subtriangular in cross-section, flat above, its sides sloping toward its ventral edge; predorsal area broad, without a regular median series of scales; belly broad and rounded, without a regular median series of scales. Occipital process 6 in the distance from its base to the dorsal. Snout pointed, much more so in the very young, the mouth very narrow, less than half the width of the interorbitals. Upper jaw greatly protractile, the

premaxillaries minute and free from each other, the maxillary a slender curved bar, its posterior end curved upward, slipping under the preorbital, not reaching to below the nares; the mandibles out of proportion, nearly 2.5 times longer, the articulation under the anterior part of the orbit. About eight tricuspid teeth inserted in the lip some distance from its anterior margin. No teeth in the lower jaw.

Cheeks narrow, covered by the second suborbital, there being a naked area only under its anterior angle.

Scales hard, in regular series on the sides, the uppermost series of the sides meeting rather irregularly behind the occipital process; in the angle between these series and the dorsal there are first a few median scales and then two series of scales which end at the dorsal; fins all naked; axillary scale of the ventral more than half as long as the fin; humeral process continued as an adnate adipose ridge. Scales all highly iridescent, without lines.

Origin of dorsal about an orbital diameter nearer the snout than to the caudal; dorsal pointed, the first rays about 4.5 in the length, the penultimate less than half as long as the longest; adipose fin small; caudal very deeply forked, the lobes pointed, a little over one-fourth of the length; anal very small, emarginate, the tip of the highest ray about reaching the tip of the last; origin of ventrals under the posterior part of dorsal, reaching half-way to first or sometimes to last anal ray; pectorals reaching nearly half-way to tip of ventrals.

Straw-colored, upper caudal lobe light orange, ranging to yellow below. Highly iridescent, a dark streak along the shoulder just behind the opercle; bases of scales of the upper part of the sides dark.

This species is abundant about the sand-bars in the lower Essequibo.

Subfamily Curimatinæ.

Curimatopsis Steindachner.

Curimatopsis Steindachner, "Ichthyologische Beiträge," v, 1876, 33.

Type, *Curimatopsis macrolepis* Steindachner.

This genus has heretofore not been taken outside of the Amazon basin.

Teeth none; mouth small, very oblique, cyprinodontiform; tongue long, narrow, free; lateral line developed on a few scales only.

119. Curimatopsis macrolepis Steindachner.

Curimatus (*Curimatopsis*) *macrolepis* Steindachner, "Ichthyologische Beiträge," v, 1876, 33 (Tabatinga; Manacapurú; Mouth of the Rio Negro).

Curimatopsis macrolepis EIGENMANN and EIGENMANN, Ann. N. Y. Acad. Sci., IV, 1889, 414 (Tabatinga; Lake Hyamary; Cudajas); Proc. U. S. Nat. Mus., XIV, 1891, 45.—EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 420.

Forty-two specimens, the largest 53 mm. Madumi Creek. (C. M. Cat. No. 2086*a–j*; I. U. Cat. No. 12273.)

One specimen, 43 mm. Cane Grove Corner. (C. M. Cat. No. 1287*a*.)

Eighty-eight specimens, the largest 57 mm. Lama Stop-Off. (C. M. Cat. No. 1288*a–o*; I. U. Cat. No. 12274.)

One specimen, 63 mm. Botanic Gardens, Georgetown. (C. M. Cat. No. 2093.)

Two specimens, about 37 mm. Konawaruk. (C. M. Cat. No. 2096; I. U. Cat. No. 12280.)

Three specimens, 40 mm. Gluck Island. (C. M. Cat. No. 2099*a–b*; I. U. Cat. No. 12283.)

Sixteen specimens, the largest 40 mm. Rockstone. (C. M. Cat. No. 2102*a–b*; I. U. Cat. No. 12285.)

Three specimens, 41–43 mm. Wismar. (C. M. Cat. No. 2103*a–b*; I. U. Cat. No. 12287.)

Similar to *Curimatus spilurus*, but readily distinguished by the shape of its mouth, or the incomplete lateral line. Occurring as it does in many places with *spilurus*, it requires a close scrutiny to pick out individuals of this species from among the young of the latter. In the collection from Rockstone, for instance, sixteen specimens of this species were mixed with 323 of *spilurus*.

Head 4.2; depth about 3; D. 11; A. 8 or 9; scales 29 or 30, of which 3–5 are with pores; eye .75 in snout, 2.8 in head, and 1.25 in interorbital.

Compressed, the preventral area rounded, with a median series of scales, the postventral area more narrowly rounded; predorsal area rounded, with a median series of about eight scales; mouth small, the lower jaw entering the profile; maxillary nearly vertical, its anterior margin convex; eye large, the cheek narrow, covered by the suborbital; interopercle at the angle as wide as the cheek.

Scales with several slightly diverging striæ, regularly imbricate, nowhere notably smaller; fins naked.

Fins small, dorsal considerably nearer snout than to caudal; caudal about 4 in the length; anal small, slightly emarginate, the anterior ray extending beyond the tip of the last; ventrals reaching anus; pectorals not to ventrals.

A plumbeous or silvery band ending in a well-defined spot on the last scales; upper part of eye sometimes red; anal yellow; upper part of caudal orange at its base, fading out backward.

CURIMATELLA Eigenmann and Eigenmann.

Curimatella EIGENMANN and EIGENMANN, Ann. N. Y. Acad. Sci., IV, 1889, 7.

Type, *Curimatus lepidurus* EIGENMANN and EIGENMANN.

Teeth none; lateral line complete; caudal lobe densely scaled; narrow margin of the broad tongue free.

120. **Curimatella alburna** (Müller and Troschel).

Anodus alburnus MÜLLER and TROSCHEL, Horæ Ichth., I and II, 1845, 26, pl. 4, fig. 3 (Lake Amucu, Brit. Guiana); in Schomburgk, Reisen, III, 1848, 633 (Lake Amucu).

Curimatus alburnus KNER, "Familie der Characinen," i, 1859, 8 (Rio Guaporé, Matto Grosso).—STEINDACHNER, "Ichthyologische Beiträge," v, 1876, 338 (Teffé); "Flussfische Südamerika's," ii, 1881, 36 (Amazon).—EIGENMANN and EIGENMANN, Ann. N. Y. Acad. Sci., IV, 1889, 10 (Surinam; Coary; Lake Hyavary; Tonantins); Proc. U. S. Nat. Mus., XIV, 1891, 46.—? BOULENGER, Trans. Zool. Soc. London, XIV, 1896, 34 (Descalvados).—PELLEGRIN, Bull. Mus. d'Hist. Nat., V, 1899, 157 (Apuré).—EIGENMANN, Ann. Carnegie Mus., IV, 1907, 1124 (Bahia Negra).

Curimatella alburna EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 420.

Seven specimens, 90–115 mm. Rupununi. (C. M. Cat. No. 2105*a–d*; I. U. Cat. No. 12289.)

Eighteen specimens, 55–65 mm. Twoca Pan. (C. M. Cat. No. 2106*a–d*; I. U. Cat. No. 12290.)

Head 3.4–3.66; depth 2.66–2.75; D. 11 or 12; A. 9 or 10; scales 5–35 to 38–5; eye 1 in snout, 3.5 in head, 1.5–2 in interorbital.

Stout; ventral profile regularly arched, dorsal profile rather steep in front, with an angle at the origin of dorsal; preventral area flat, with a median series of scales and blunt lateral keels; postventral area with a median and two lateral keels converging toward the anal; predorsal area bluntly keeled, with a median series of scales.

Snout broad, subtruncate mouth subterminal, the thin lower jaw included.

Scales crenate, with two or three diverging striæ, nowhere notably increased or decreased on the body; caudal lobes densely covered with small scales to near their tip; lateral line straight.

Anterior dorsal and anal rays in the adult prolonged, the former reaching the adipose, the latter the caudal; caudal a little more than 3 in the length, ventrals not reaching the anus, pectorals not to ventrals.

Silvery, without definite markings.

CURIMATUS[29] Oken.

"Curimates" CUVIER, Mém. Mus. d'Hist. Nat., I, 1815, 109 (French name only, unaccompanied by diagnosis or name of type).

"Les Curimates" CUVIER, Règne Animal, II, 1817, 165; ed. 2, II, 1829, 309.

Curimatus OKEN, Isis, 1817, 1183.—VALENCIENNES, Hist. Nat. Poiss., XX, 1849, 4, etc.

Curimata CLOQUET, Dict. Hist. Nat., XII, 1818, 240.

Curimates GOLDFUSS, Hand. Zool., II, 1820,—.

Characinus MINDLING, Lehrb. Nat. Fische, 1832, 119.

Cyphocharax FOWLER, Proc. Acad. Nat. Sci. Phila., 1906, 297 (*spilurus*).

Steindachnerina FOWLER, Proc. Acad. Nat. Sci. Phila., 1906, 288 (*trachystethus*).

Peltapleura FOWLER, Proc. Acad. Nat. Sci. Phila., 1906, 300 (*cyprinoides*).

Type, *Salmo edentulus* Bloch = *Salmo cyprinoides* Linnæus.

Belly rounded or flat, without spines; tongue short and thick, adnate; mouth horizontal or slightly oblique; lateral line complete; caudal lobes naked; scales large or medium.

KEY TO THE GUIANA SPECIES OF CURIMATUS.

a. Scales small, 36 or fewer in the lateral line. (*Cyphocharax*.)

b. Roof of mouth with few dermal ridges.

c. A conspicuous black spot at the end of the lateral line..... **spilurus.**

cc. Caudal peduncle plain; lateral line 33–34; dorsal plain..... **microcephalus.**

bb. Roof of mouth with numerous flaps, ridges, and papillæ; caudal peduncle with a black median line, fading out forward.

d. Dorsal with a large black spot at the base of its middle rays..... **morawhannæ.**

dd. Dorsal without black spot..... **issororoënsis.**

aa. Scales small, 50–62 in the lateral line; at least the scales of the breast with serrate margins. (*Curimatus*.)

e. Roof of mouth with numerous folds of skin; upper gill-arches with papillæ and with valve-like folds at their anterior ends; lower gill-arches with backward and forward directed raker-like filaments on their anterior halves, forming a grill on the floor of the mouth, and with a few large papillæ on their posterior halves..... **schomburgki.**

ee. Roof of mouth with two feeble folds; no gill-rakers; dorsal falcate..... **ciliatus.**

121. **Curimatus spilurus** Günther. (Plate XXXIV, fig. 1.)

"Curucu."

Curimatus spilurus GÜNTHER, Catalogue, V, 1864, 288 (Essequibo).—STEINDACHNER, "Ichthyologische Beiträge," v, 1876, 31 (Hyanuary; Iça; Teffé; Rio Negro).—COPE, Proc. Am. Philos. Soc., XVII, 1878, 684 (Peruvian Amazon).

[29] *Anodus cyprinoides* MÜLLER and TROSCHEL, in Schomburgk, Reisen, III, 1848, 633 (Essequibo, Demarara; Rupununi).

—Steindachner, "Flussfische Südamerika's," i, 1879, 5 (Orinoco near Ciudad Bolivar).—Eigenmann and Eigenmann, Ann. N. Y. Acad. Sci., IV, 1889, 419 (Içá; Teffé; Jutahy; Cudajas; José Fernandez; Lake Hyanuary; Alexo; Ueranduba; Jatuarana; Obidos); Proc. U. S. Nat. Mus., XIV, 1891, 47.—Perugia, Ann. Mus. Genova, (2), XVIII, 1897, 24 (Reyes).—Vaillant, Bull. Mus. d'Hist. Nat., V, 1899, 155 (Carnot).—Boulenger, Bull. Mus. Zool. ed. Anat. Comp. Torino, XV, 1900 (Urucuru).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 421.

? *Curimata* (*Cyphocharax*) *spilura* Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 297, fig. 4 (Peruvian Amazon).

Three specimens, 95–100 mm. Mud-flats, Demerara River. (C. M. Cat. No. 2089*a–b*; I. U. Cat. No. 12275.)

Twenty-two specimens, 70–130 mm. Tukeit. (C. M. Cat. No. 2090*a–e*; I. U. Cat. No. 12276.)

Two specimens, 112–117 mm. Potaro Landing. (C. M. Cat. No. 2091*a*; I. U. Cat. No. 12277.)

Nine specimens, 89–101 mm. Tumatumari. (C. M. Cat. No. 1292*a–e*; I. U. Cat. No. 12278.)

One specimen, 89 mm. Crab Falls. (C. M. Cat. No. 1294.)

Eight specimens, 35–52 mm., and one 110 mm. Konawaruk. (C. M. Cat. No. 1295*a–d*; I. U. Cat. No. 12279.)

Nine specimens, 85–120 mm. Below Packeoo Falls. (C. M. Cat. No. 1297*a–e*; I. U. Cat. No. 12281.)

About two hundred twenty specimens, the largest 60 mm. Rupununi. (C. M. Cat. No. 2098*a–z*; I. U. Cat. No. 12282.)

Fifteen specimens, the largest 50 mm. Gluck Island. (C. M. Cat. No. 2100*a–j*; I. U. Cat. No. 12284.)

Three hundred twenty-three specimens, the largest 80 mm. Rockstone. (C. M. Cat. No. 2101*a–z*; I. U. Cat. No. 12286.)

Seventy-eight specimens, the largest 106 mm. Wismar. (C. M. Cat. No. 2104*a–j*; I. U. Cat. No. 12288.)

Abundant. Easily distinguished by its bright caudal spot and by its size.

Head 4; depth about 3; D. 11 or 12; A. 9; scales 5.5–35–5; eye 1 in snout, 3 in head, 1.2 in interorbital.

Elongate, not greatly compressed; preventral area flattish, with three obscure keels; predorsal area bluntly keeled, with or without a regular series of median (about nine) scales; snout depressed, the mouth inferior.

Scales cycloid, crenate on preventral area, with two or three diverging striæ; lateral line straight, complete; fins naked.

Fins small; highest dorsal ray about 4 in the length, its origin equidistant from snout and end of adipose; caudal a little longer than dorsal; anal emarginate, the first ray reaching beyond the tip of the last ray; ventrals reaching vent or shorter; pectorals to within three scales of ventrals.

Highly iridescent, with a variable black spot at end of caudal peduncle.

122. **Curimatus microcephalus** Eigenmann and Eigenmann. (Plate XXXIV, fig. 2.)

Curimatus microcephalus Eigenmann and Eigenmann, Ann. N. Y. Acad. Sci., IV, 1889, 15 (Surinam); Proc. U. S. Nat. Mus., XIV, 1891, 47.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 421.

Three specimens, 75–124 mm. Tukeit. (C. M. Cat. No. 2106*a–b*; I. U. Cat. No. 12291.)

Eight specimens, 60–110 mm. Creek below Potaro Landing. (C. M. Cat. No. 2107*a–d*; I. U. Cat. No. 12292.)

Two specimens, 40–92 mm. Konawaruk. (C. M. Cat. No. 2107*a–b*.)

Eight specimens, the largest 55 mm. Amatuk. (C. M. Cat. No. 2108*a–d*; I. U. Cat. No. 12293.)

Eleven specimens, the largest 105 mm. Kangaruma. (C. M. Cat. No. 2109*a–f*; I. U. Cat. No. 12294.)

Two specimens, 62 mm. Mora Passage. (C. M. Cat. No. 2110*a*; I. U. Cat. No. 12275.)

Seven specimens, the largest 71 mm. Crab Falls. (C. M. Cat. No. 2118*a–d*; I. U. Cat. No. 12296.)

Two specimens, 46–56 mm. Wismar. (C. M. Cat. No. 2111*a*; I. U. Cat. No. 12297.)

Twenty-nine specimens, the largest 90 mm. Erukin. (C. M. Cat. No. 2112*a–e*; I. U. Cat. No. 12298.)

Sixty-one specimens, the largest 100 mm. Rockstone. (C. M. Cat. No. 2113*a–i*; I. U. Cat. No. 12299.)

Two hundred and fourteen specimens, the largest 125 mm. Tumatumari. (C. M. Cat. No. 2114*a–z* and 2115; I. U. Cat. No. 12300.)

Head 4; depth 3; D. 11 or 12; A. 9 or 10; scales 5–33 or 34–5; eye 1+ in snout, 3 in head, 1+ in interorbital.

Elongate; ventral area rounded, with a median series of scales; predorsal

area narrowly rounded, with a median series of about nine scales; snout rounded, the mouth inferior. Roof of mouth with a few inconspicuous ridges.

Scales all cycloid, with two diverging striæ; lateral line straight; fins all naked.

The shape and size of the fins is as in *C. spilurus*.

Highly iridescent, the fins brick-red in life. No distinct markings.

123. **Curimatus morawhannæ** sp. nov. (Plate XXIV, fig. 3.)

Type, 90 mm. Morawhanna. (Carnegie Mus. Catalog of Fishes No. 2122.)

Cotypes, fifty-one specimens, the largest 90 mm. Morawhanna. (C. M. Cat. No. 2121*a–i*; I. U. Cat. No. 12303.)

Cotypes, three specimens, 48–55 mm. Mora Passage. (C. M. Cat. No. 2120*a–b*; I. U. Cat. No. 12302.)

Very similar to *C. microcephalus*. Thirty-five or thirty-six scales in the lateral line; posterior half of lateral line with a dark streak, most intense toward its end; a black spot on the base of the middle dorsal rays; roof of mouth with numerous conspicuous flaps, lobes, and papillæ.

124. **Curimatus issororoënsis** sp. nov. (Plate XXXIV, fig. 4.)

Type, 104 mm. Issororo Rubber Plantation. (Carnegie Museum Catalog of Fishes No. 2119.)

Cotypes, two specimens. Issororo Rubber Plantation. (C. M. Cat. No. 2123; I. U. Cat. No. 12301.)

Very similar to *C. morawhannæ*, but lacking the dorsal spot.

Head 4; depth 2.8; D. 11; A. 9; scales $5\frac{1}{2}$–36–5.

125. **Curimatus schomburgki** Günther. (Plate XXXV, fig. 1.)

"Cuticuru."

Curimatus cyprinoides (? not of Linnæus) Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 7 (Essequibo).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 633 (Essequibo; Demerara; Rupununi).

Curimatus schomburgkii Günther, Catalogue, V, 1864, 291 (British Guiana; Demerara).—Eigenmann and Eigenmann, Ann. N. Y. Acad. Sci., IV, 1889, 23 (Surinam); Proc. U. S. Nat. Mus., XIV, 1891, 48.—Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 303, fig. 8 (Surinam).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 422.

So far as known, this species is found in British Guiana and Surinam. It is very abundant in quiet waters, especially along the coast. About two hundred specimens were preserved.

TABLE OF SCALES IN THE LATERAL LINE OF C. SCHOMBURGKI.

Locality.	51	52	53	54	55	56	57	58	59	60	61	62	63
Lama Stop-Off								2	1	3	2	1	1
Maduni Creek				1		1	3				1		
Koreabo	1					2	1	5	8	3	5	1	
?					1		1	2	2	2	1	1	
Issorora							2			4	3	1	
Morawhanna							1	1	2	2			
Georgetown					1					1			
Wismar					1	2	3	3		3	2		

Besides the type in the British Museum and the specimens mentioned by Müller and Troschel, and by Cuvier and Valenciennes, I have examined:

Twenty specimens, 77–215 mm. Wismar. (C. M. Cat. No. 2068*a–e*; I. U. Cat. No. 12256.)

Twenty-three specimens, 95–260 mm. Lama Stop-Off. (C. M. Cat. No. 2069*a–e*; I. U. Cat. No. 12257.)

Seventy-five specimens, 77–225 mm. Koreabo Rubber Plantation. (C. M. Cat. No. 2075*a–j*; I. U. Cat. No. 12258.)

Twenty-four specimens, 85–145 mm. Koreabo Rubber Plantation. (C. M. Cat. No. 2071*a–e*; I. U. Cat. No. 12259.)

Ten specimens, 120–158 mm. Issororo. (C. M. Cat. No. 2072*a–e*; I. U. Cat. No. 12260.)

Twenty-three specimens, 57–90 mm. Morawhanna. (C. M. Cat. No. 2073*a–e*; I. U. Cat. No. 12261.)

Six specimens, 45–68 mm. Creek in Mora Passage. (C. M. Cat. No. 2074; I. U. Cat. No. 12269.)

One specimen, 139 mm. Mud-flats below Wismar. (C. M. Cat. No. 2075.)

Eight specimens, 96–145 mm. Maduni Creek. (C. M. Cat. No. 2076*a–d*; I. U. Cat. No. 12262.)

Three specimens, 187–255 mm. Botanic Garden. (C. M. Cat. No. 2085*a–b*; I. U. Cat. No. 12271.)

Four specimens, 54, 59, 187 and 255 mm. Georgetown trenches. (C. M. Cat. Nos. 2077*a* and 2084*a*; I. U. Cat. Nos. 12270 and 12263.)

One specimen, 80 mm. Christianburg. (C. M. Cat. No. 2078*a*.)

Head 3–3.28; depth 2.25–2.6; D. 11 or 12; A. 10 or 11; scales 13 to 15–54[30] to 63–8; eye 1 in snout, 3.25 in head, 1–1.6 in interorbital.

Compressed; dorsal profile high, depressed over the eyes; preventral area flat, angulated on the sides, postventral area with a median keel; predorsal area narrowly rounded, scaled; a triangular adipose area from near the edge of the operele

[30] In one case 51.

to below the nares; premaxillary broad, the mouth inferior, on a level with the lower margin of the eye; suborbital narrow.

Origin of dorsal nearer snout than to caudal, the second and third rays prolonged, reaching in extreme cases to the caudal; caudal deeply forked, the lobes longer than the head; pectoral reaching ventrals; anal short, emarginate, the tips of the anterior rays reaching base or tip of the last ray; ventrals reaching anal or a little shorter.

Scales regularly increasing in size from the back to the preventral area, where they are largest, their margins always ciliated on the preventral area, becoming ciliated on other areas with age; a large axillary scale; fins naked; lateral line nearly straight, ending in a hastate scale at the base of the caudal.

Highly iridescent blue above, silvery below, becoming frosted with age; vertical fins roseate, shading to yellowish at the base.

The specimens from Guiana in the Jardin des Plantes are faded and soft, but are probably of this species.

126. **Curimatus ciliatus** Müller and Troschel.

Anodus ciliatus Müller and Troschel, Horæ Ichth., 1845, 25, pl. 4, fig. 4; in Schomburgk, Reisen, III, 1848, 633 (Lake Amucu).

Curimatus ciliatus Castelnau, Anim. Am. Sud, Poiss., 1855, 58 (Amazon).—Kner, "Familie der Characinen," i, 1859, 7 (Ypanema; Guaporé).—Günther, Catalogue, V, 1864, 292.—? Perugia, Ann. Mus. Genova, (2*a*), X, 1891, 39 (Alto Paraná).

Psectrogaster ciliata Eigenmann and Eigenmann, Ann. N. Y. Acad. Sci., IV, 1889, 5; 1891, 46.—? Berg, An. Mus. Nac. Buenos Aires, V, 278 (Coary); Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 46 (Descalvados, Rio Paraguay).—Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 305 (Ambyiacu and Solimoes).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 420.

Curimatus rutiloides Cope (not of Kner), Proc. Acad. Nat. Sci. Phila., 1871, 258 (Ambyiacu).

Curimatus cyprinoides[31] Cope, Proc. Acad. Nat. Sci. Phila., 1871, 291 (Solimoes).

Curimatus essequibeusis Günther, Catalogue, V, 1864, 291 (Essequibo).—Eigenmann and Eigenmann, Ann. N. Y. Acad. Sci., IV, 1889, 23; Proc. U. S. Nat. Mus., XIV, 1891, 48.

[31] The specimen in the British Museum marked *cyprinoides* has gill-rakers.

TABLE OF SCALES IN THE LATERAL LINE OF C. CILIATUS.

	50	51	52	53	54	55	56	57	58	59	60	61
Rockstone				3	1				1		1	1
Crab Falls				1	1							
Konawaruk			7	3		1	1					
Warraputa	1				1							
Rupununi			2	1								

I have examined the type of *A. ciliatus* in Berlin and that of *C. essequibensis* in London, and:

Three specimens, 161–170 mm. Rupununi. (C. M. Cat. No. 2079*a–b*; I. U. Cat. No. 12265.)

Fifteen specimens, 50–72 mm. Rockstone. (C. M. Cat. No. 2080*a–c*; I. U. Cat. No. 12266.)

Five specimens, 68–83 mm. Crab Falls. (C. M. Cat. No. 2081*a–c*; I. U. Cat. No. 12267.)

Two specimens, 80–83 mm. Warraputa. (C. M. Cat. No. 2082; I. U. Cat. No. 12268.)

Sixteen specimens, 68–160 mm. Konawaruk. (C. M. Cat. No. 2083*a–c*; I. U. Cat. No. 12272.)

Head 3 (in the young)–3.4; depth 2.1–2.8 (in the young); D. 11 or 12; A. 10–12; scales 14 or 15–50 to 61–8 or 9; eyes a little longer than the snout, 3.3 in the head, 1.75 in the bony interorbital, (1.25 in the young).

Elliptical, the ventral profile regularly arched, the dorsal profile but little depressed over the head; preventral area obscurely angulated on the sides, postventral area trenchant, but with a median series of non-spinous scales; predorsal line scaled, but without a median series of scales; a well-developed adipose lid; mouth terminal, the premaxillary not visible from below; no gill-rakers; palate with a feeble dermal ridge on each side; tongue adnate.

Dorsal small, truncate, the anterior rays scarcely prolonged, but reaching beyond the tip of the last, its origin nearly in the middle of the length; caudal forked, the lobes a little more than one-fourth of the length; anal emarginate, its base oblique; ventrals not reaching anus, pectorals not to ventrals.

Scales increasing in size from the dorsal to in front of the ventrals, all of them strongly serrate; fins naked; axillary scale small. Lateral line straight.

Air-bladder filiform, reaching to the middle of the anal.

In the description everything but the formulas is derived from the larger specimens. The young fish is much slenderer; the fins are longer, the scales are ciliated on the breast, and the dorsal rarely reaches to the adipose.

Subfamily Prochilodinæ.

Prochilodus Agassiz.

Prochilodus Agassiz, Selecta Gen. et Spec. Pisc. Bras., 1829, 62.

Pacu Spix, Selecta Gen. et Spec. Pisc. Bras., 1829, pls. 38, 39.

Chilomyzon Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 309, fig. 11 (*steindachneri*).

Type, *Prochilodus argenteus* Agassiz.

Fishes of moderate or large size. Mouth broad, jaws very weak; teeth inserted on lips, movable, in a single series on the sides, in two series in the middle. A procumbent dorsal spine; scales rough ctenoid; mouth convertible into a large circular sucking disk, not strictly protractile.

A genus of about twenty-five known species, from the La Plata to Peru, the Rio Magdalena, and western Ecuador. One species occurs in the Essequibo, and another, closely allied, across the divide, in the upper branches of the Ireng.

127. Prochilodus rubrotæniatus Schomburgk.

Prochilodus rubrotæniatus Schomburgk, Fishes Brit. Guiana, I, 1841, 258, pl. 28 (Rios Branco, Negro and Essequibo).—Schomburgk, Reisen, III, 1848, 644 (Essequibo).—Steindachner, "Fisch-fauna des Cauca," etc., 1880, 16 (Cauca). —Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 48.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 424.

Prochilodus nigricans Günther (not of Agassiz), Catalogue, V, 1864, 295 (Essequibo).

One specimen, 303 mm. Tumatumari. (C. M. Cat. No. 2064.)

Seven specimens, 230–330 mm. Rockstone sand-bank. (C. M. Cat. No. 2065*a–d*; I. U. Cat. No. 12254.)

Head 3.75–3.8; depth 2.45–2.6; D. 12 (counting the last filament); A. usually 10, sometimes 11, or even 12; scales 7 or 8–45 or 46–6 or 7; eye 1.33–1.5 in snout, 3.75–4 in head, 2.4 in interorbital.

Heavy, compressed, deep, subrhomboidal; anterior profile steep, rounded to the nape, concave over the eyes; predorsal area bluntly keeled, with a median series of about fourteen scales; preventral region broad, angulated at the sides, with a median series of slightly keeled scales; postventral region narrowly keeled. Head very broad, convex between the eyes; mouth terminal, the lower jaw but very slightly shorter than the upper.

Scales large, rough, denticulate at the margin, very regularly arranged; fins naked; a large axillary scale; lateral line straight.

Fins large; dorsal rounded, sometimes high, the middle ray in No. 2064 being

longer than the head; origin of dorsal equidistant from tip of snout and origin of adipose; caudal broad, the rays leathery (usually damaged); anal emarginate, the second and third rays extending past the tip of the last; origin of dorsal and ventrals about equidistant from tip of snout, reaching over half-way to anal; pectorals reaching ventrals, or a little shorter.

Plumbeous; light streaks extending along the middle of the rows of scales; posterior part of dorsal and middle of caudal barred; lower fins hyaline to dusky.

This species was abundant on the sand-bar near Rockstone and was also taken in the cataract at Tumatumari. The flesh is soft and specimens are very hard to preserve.

128. **Prochilodus maripicru** sp. nov. (Plate XXXV, fig. 2.)

Type, 282 mm. Maripicru Creek. (Carnegie Museum Catalog of Fishes No. 2066.)

Cotypes, two specimens, 220–375 mm. Maripicru Creek, a branch of the Ireng. (C. M. Cat. No. 1067; I. U. Cat. No. 12255.)

Head 3.75–4; depth 3; D. 12; A. 10; scales 7 or 8–45–6. Eye 1.75–2 in snout, 4.5–4.8 in head, 2.5–3 in interorbital.

Very near to *P. rubrotæniatus*, *P. argenteus*, and *P. lineatus*, but the head narrower, the mouth nearly a fourth narrower in specimens of equal size, the snout more elongate, projecting beyond the lower jaw; origin of dorsal nearer to adipose than to snout.

Color much as in *P. rubrotæniatus*, but the dark streaks between the rows of scales being conspicuous rather than the light band along the rows of scales.

Subfamily Chilodinæ.

Tylobronchus[32] gen. nov.

Fourth gill-arch dilated behind, its surface corrugated. Anal short, emarginate; a single series of feeble teeth in each jaw, those of the upper jaw bifid, three series on the pharyngeals; scales large, serrate; lateral line straight, complete. Mouth small, inferior.

Anterior air-bladder considerably larger than the eye; the posterior long, straight, tapering to the origin of the anal, 2.66 in the length. Alimentary canal much coiled below the anterior air-bladder, nearly twice the length of the entire fish. Vertebræ 15 + 16, without counting those which are coalesced.

This genus differs from *Caenotropus* in having teeth in the lower as well as in the upper jaw.

[32] τύλος, a swelling; βρόγχος, throat.

129. **Tylobronchus maculosus** sp. nov. (Plate XXXV, fig. 3.)

Type, 113 mm. Creek below Potaro Landing. (Carnegie Museum Catalog of Fishes No. 1923.)

Cotype, one specimen, 28 mm. Wismar. (C. M. Cat. No. 1917.)

Cotype, twenty-one specimens, 47–68 mm. Rockstone. (C. M. Cat. No. 1918*a–e*; I. U. Cat. No. 12219.)

Cotype, one specimen, 104 mm. Crab Falls. (C. M. Cat. No. 1919.)

Cotypes, fifty-one specimens, 65–107 mm. Tumatumari. (C. M. Cat. No. 1920*a–e*; I. U. Cat. No. 12220.)

Cotypes, nineteen specimens, 97–143 mm. Creek below Potaro Landing. (C. M. Cat. No. 1922*a–c*; I. U. Cat. No. 12221.)

Cotypes, three specimens, 97–136 mm. Kangaruma. (C. M. Cat. No. 1921*a*; I. U. Cat. No. 12222.)

This species resembles young *Erimyzon sucetta*.

Head 3.66–3.75; depth 3.5; D. 12; A. 9 or 10; scales 4–26 or 27–3; eye 1 in snout, 3 in head, 1 in interorbital.

Heavy, but little compressed, the head very broad; preventral area broad, rounded, with a median series of seven scales to between the anterior margins of the pectoral; predorsal area broad, with a median series of four or five scales and two paired scales near the occiput; occipital process short and broad, reaching about one-sixth to the dorsal; interorbital flat, broad; fontanels tapering to above the nares; a bridge over the posterior margin of the pupil, another over the anterior margin of the eye.

Cheeks very narrow, covered by the suborbitals; mouth small, the lower jaw with a crescentic margin, included, the mouth inferior; lips thick, maxillary slipping under the preorbital for its entire length, but not concealed by it, reaching to below nares; about nine minute, bifid teeth on each side of the upper jaw; a smaller number of conical or truncate teeth on each side of the lower jaw. Lower pharyngeals with three series of bluntly conical teeth, the first series, removed from the second, composed of six teeth; the six teeth of the second series much larger, the inner one largest; four or five teeth in the last series; tongue adnate, without free margin; mouth without supplemental ridges or valves.

Gill-rakers short, dendritic, 10 + 14.

Scales large, with dentate margin, very regularly imbricate; fins naked; a large axillary scale; lateral line nearly straight.

Dorsal large, rounded, its origin about equidistant from nares and origin of adipose, its height about 4 in the length; adipose well-developed; caudal deeply

forked, the lobes equal, 3.5 in the length; anal emarginate, the highest rays reaching considerably beyond the tip of the last ray; origin of ventrals near middle of body, not reaching anal by about four scales; pectorals reaching ventrals.

Straw-color, darker above; a conspicuous black band from tip of snout to end of middle caudal rays; each scale above the lateral line with a dark spot at its base, or along the middle of the back with a dusky tip; scales between the lateral line and ventrals and anal with similar, but smaller, spots; a conspicuous black spot on the tip of anterior dorsal rays; fins otherwise hyaline.

Chilodus Müller and Troschel.

Chilodus Müller and Troschel, Horæ Ichth., I, 1845, 26 (*punctatus*).

Cænotropus Günther, Catalogue, V, 1864, 297 (*labyrinthicus* and *punctatus*).

Type, *Chilodus punctatus* Müller and Troschel.

Fourth gill-arch dilated behind, its surface corrugated; anal elongate, scarcely emarginate; each jaw with a series of feeble, truncate, incisor-like teeth; scales large, entire; lateral line straight, complete; mouth small, terminal.

Alimentary canal about 1.33 times the length of the entire fish. Vertebræ 12 + 17, not counting the coalesced vertebræ.

130. **Chilodus punctatus** Müller and Troschel. (Plate XXXV, fig. 4.)

Chilodus punctatus Müller and Troschel, Horæ Ichth., I, 1845, 26, pl. 4, fig. 2 (Lake Amucu, Guiana); in Schomburgk, Reisen, III, 1848, 634 (Swamps in savannas).—Kner, "Familie der Characinen," i, 1859, 15.—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 79.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 424.

Citharinus chilodus Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 103.

Cænotropus punctatus Günther, Catalogue, V, 1864, 297.—Vaillant, Bull. Mus. d'Hist. Nat., V, 1899, 155 (Carnot).

Eight specimens, 37–60 mm. Rupununi. (C. M. Cat. No. 2205*a–e*; I. U. Cat. No. 12360.)

One specimen, 56 mm. Konawaruk. (C. M. Cat. No. 1913.)

One specimen, about 38 mm. Gluck Island. (C. M. Cat. No. 1914.)

Forty-two specimens, 40–61 mm. Rockstone. (C. M. Cat. No. 1915*a–e*; I. U. Cat. No. 12217.)

Eleven specimens, 55–82 mm. Crab Falls. (C. M. Cat. No. 1916*a–c*; I. U. Cat. No. 12218.)

Head 3.66; depth 3; D. 11; A. 12; scales 4–25 to 27–4; eye .75 in snout, 3 in head, 1 in interorbital.

Compressed, back elevated, the profile descending rapidly to the sharp, depressed snout; preventral area rounded, with about eight median scales to between the origin of the pectorals; predorsal area narrowly rounded, with a median series of five to seven scales and one or two paired scales near the occiput. Occipital process pointed, reaching about one-fourth the distance to the dorsal fin; interorbital flattish, grooved; fontanel tapering to above the anterior margin of the eye, with a bridge above the posterior margin of the pupil.

Cheeks narrow, covered by the interorbitals; mouth small, terminal, directed obliquely upward; lips medium; maxillary slipping under the preorbital, but not concealed by it, reaching to below the nares; each jaw with about twelve (six on each side) minute, brown-tipped teeth; lower pharyngeal teeth in three series, of which the anterior series is remote, composed of about six teeth; gill-rakers minute, about fourteen on the lower arch.

Scales large, entire, very regularly imbricate; fins naked, an axillary scale. Lateral line straight.

Dorsal high, rounded, its height about 3 in the length, its origin about equidistant from snout and adipose; adipose well-developed; caudal deeply forked, its lobes equal, about 3.5 in the length; anal obliquely truncate, its highest rays not reaching base of last ray; ventrals not reaching anal by one or two scales; their origin near middle of the length; pectorals reaching ventrals.

Straw-colored, a dark band from chin to base of middle caudal rays; bases of all the scales (except those of the breast) with a dark brown spot; anal dark; dorsal spotted, the tips of the longest rays dark brown.

Subfamily Hemiodontinæ.

Parodon Cuvier and Valenciennes.

Parodon Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 50, pl. 637.

Type, *Parodon suborbitalis* Cuvier and Valenciennes.

Mouth inferior, cutting edge of the pluricuspid teeth of the upper jaw forming a straight transverse line; teeth of the lower jaw absent or else confined to the sides; no fontanel; gill-membranes united, free from the isthmus.

131. **Parodon bifasciatus** sp. nov. (Plate XXXVI, fig. 1.)

Type unique, 104 mm. Maripieru Creek. (Carnegie Museum Catalog of Fishes No. 1925.)

Head 5; depth 3.5; D. II; A. 9; scales 4-38-3; eye 1.5 in the snout, 4.5 in the head, 2 in the interorbital; teeth $\frac{2+4-4+2}{3-3}$.

Heavy, tapering rapidly to the conical snout. Lower caudal lobe longer than the upper.

Dark above, lighter below; a black band from snout to end of middle caudal rays, a narrower one parallel with it from the occiput to the base of the upper caudal rays; a blackish band across the upper part of the anterior dorsal rays.

Hemiodus Müller.

Hemiodus Müller, Monatschr. Akad. Wiss. Berlin, Juni, 1842, 324.

Hemiodopsis Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 318 (*microlepis*).

Type, *Hemiodus crenidens* Müller = *Hemiodus unimaculatus* (Bloch).

Teeth in the upper jaw only, pluricuspid, in a horseshoe-shaped series; mouth inferior; gill-membranes free from each other and from the isthmus; fontanels large; scales below the lateral line of the same size as those above it.

Key to the Guiana Species of Hemiodus.

a. Sides with three black cross-bands; a black spot on the caudal peduncle, continued to the end of the lower caudal lobe; upper caudal lobe with a weaker black band. . . . . **quadrimaculatus.**

aa. A black spot on the middle of the sides, half-way between dorsal and adipose, and a black band extending from it to the tip of the lower caudal lobe. . . . . **semitæniatus.**

132. **Hemiodus quadrimaculatus** Pellegrin. (Plate XXXVI, fig. 2.)

"Wuranali" of the Wacusi Indians.

Hemiodus quadrimaculatus Pellegrin, Bull. Mus. d'Hist. Nat., XIV, 1908, 344 (Camopi R., Fr. Guiana).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 423.

One specimen, 110 mm. Tukeit. (C. M. Cat. No. 1926.)

Three specimens, 55–70 mm. Amatuk. (C. M. Cat. No. 1927; I. U. Cat. No. 12187.)

Thirty-four specimens, the largest 81 mm. Tumatumari, in pools above the cataract. (C. M. Cat. No. 1928*a–e*; I. U. Cat. No. 12188.)

Six specimens, 57–125 mm. Crab Falls. (C. M. Cat. No. 1929*a* and 1930; I. U. Cat. No. 12189.)

A conspicuously marked species, evidently closely related to, if not identical with, *Hemiodus quadrimaculatus* Pellegrin.

Head about 4; depth 4–4.4; D. 12; A. 10; scales 7 or 8–44 to 46–4 or 5. Eye 1.3 in snout, 3.3 in head, 1 in interorbital.

Dorsal and ventral outlines equally arched, the snout pointed, projecting considerably; preventral area broad, with a regular median series of scales.

Twenty to twenty-four teeth in the upper jaw.

Dorsal about equal to the length of the head without the opercle, its origin equidistant from tip of snout and tip of adipose; caudal deeply forked; anal emarginate; ventrals not reaching anus by about four scales; pectorals not reaching ventrals by about five scales.

A large axillary scale; fins naked; scales with several vermiculated horizontal striæ.

Three black cross-bands, the first half-way between dorsal and tip of occipital process, the second from bases of last dorsal rays, and the third in front of the anal; each caudal lobe with a black band, the lower one continuous with an elongate spot on the caudal peduncle.

133. **Hemiodus semitæniatus** Kner. (Plate XXXVI, fig. 3.)

Hemiodus semitæniatus Kner, "Familie der Characinen," i, 1859, 18, pl. 4, fig. 7 (Rio Guaporé).—Günther, Catalogue, V, 1864, 299.—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 49.—Boulenger, Trans. Zool. Soc. London, XIV, 1896, 34 (San Luis, Matto Grosso).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 423.

Seven specimens, 75–86 mm. Konawaruk. (C. M. Cat. Nos. 1931, 1932; I. U. Cat. No. 12190.)

One specimen. Gluck Island. (C. M. Cat. No. 1945.)

Very closely allied to *H. gracilis* Günther.

Head 4.3–4.5; depth 4–4.25 (5.6 in the type of *gracilis*); D. 11; A. 9–11; scales 7–44 or 45–4. Eye 1 in snout, 3.2 in head, 1+ in interorbital.

Slender; dorsal and ventral profiles equally curved; predorsal and preventral area with regular median series of scales. Snout projecting the width of the upper lip; about twenty-four teeth in the upper jaw.

Height of dorsal nearly equal to the length of the head, its origin equidistant from tip of snout and tip of adipose; anal short, very slightly emarginate, the longest ray projecting but little beyond the tip of the last ray; caudal deeply forked; ventrals not reaching anus by about four scales; pectorals not to ventrals by about seven scales.

A large axillary scale; fins naked; each scale with several horizontal striæ.

Iridescent silvery; an oval black spot on the middle of the sides half-way between the dorsals, a conspicuous black band along the inner margin of the lower caudal lobe, tapering forward to the lateral spot; anal and upper caudal lobe peppered; peppered bands (evident only with a lens) across the sides in front of the dorsal, across the region of the lateral spot, and across the caudal peduncle; dorsal and tips of caudal lobes pink in life.

The types of *H. gracilis* from the River Cupai, 800 miles from the sea, are much slenderer.

ANISITSIA Eigenmann.

Anisitsia EIGENMANN, Smiths. Misc. Coll., Quarterly Issue, XLV, 1903, 144.

Type, *Anodus notatus* Schomburgk.

Similar to *Anodus*, but the scales increasing in size and decreasing in number from the lateral line downward.

134. **Anisitsia notata** (Schomburgk).

Anodus notatus SCHOMBURGK, Fishes Brit. Guiana, I, 1842, 218, pl. 15 (Rio Negro).

Hemiodus notatus CUVIER and VALENCIENNES, Hist. Nat. Poiss., XXII, 1848, 119, pl. 638.—CASTELNAU, Anim. Am. Sud, Poiss., 1855, 64 (Paraguay).—KNER, "Familie der Characinen," i, 1859, 22 (Guaporé).—GÜNTHER, Catalogue, V, 1864, 298 (Essequibo; Surinam).—STEINDACHNER, "Flussfische Südamerika's," ii, 1881, 40 (Rio Trombetas; Rio Guaporé).—EIGENMANN and EIGENMANN, Proc. U. S. Nat. Mus., XIV, 1891, 49.

Anisitsia notata EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 423.

Hemiodus unimaculatus (not of Bloch) MÜLLER and TROSCHEL, in Schomburgk, Reisen, III, 1848, 633 (Essequibo); Horæ Ichth., III, 1849, 9.

Hemiodus microcephalus GÜNTHER, Catalogue, V, 1864, 298 (River Capin).—EIGENMANN and EIGENMANN, Proc. U. S. Nat. Mus. XIV, 1891, 49.

Ten specimens, 80–112 mm. Christianburg. (C. M. Cat. No. 1933*a–b*; I. U. Cat. No. 12191.)

Three specimens, 64–80 mm. Kumaka. (C. M. Cat. No. 1934*a*; I. U. Cat. No. 12200.)

Sixteen specimens, 74–89 mm. Malali. (C. M. Cat. No. 1935*a–c*; I. U. Cat. No. 12192.)

Eighteen specimens, 71–111 mm. Bartica, rocks. (C. M. Cat. No. 1936*a–c*; I. U. Cat. No. 12193.)

Two specimens, about 190 and 195 mm. Bartica, rocks. (C. M. Cat. No. 1937*a*; I. U. Cat. No. 12194.)

Twenty-seven specimens, 58–95 mm. Wismar. (C. M. Cat. No. 1939*a–e*; I. U. Cat. No. 12195.)

Five specimens, 91–112 mm. Crab Falls. (C. M. Cat. No. 1940*a–b*; I. U. Cat. No. 12196.)

Fifteen specimens, 75–100 mm. Mud-flats below Wismar. (C. M. Cat. No. 1941*a–e*; I. U. Cat. No. 12197.)

Nineteen specimens, 57–85 mm. Lama Stop-Off. (C. M. Cat. No. 1924*a–e*; I. U. Cat. No. 12198.)

Two specimens, 69–72 mm. Gluck Island. (C. M. Cat. No. 1943*a*; I. U. Cat. No. 12199.)

Thirteen specimens, 65–200 mm. Rockstone. (C. M. Cat. No. 1944*a–e*; I. U. Cat. No. 12201.)

Head 4–4.25; depth 3.5–4.5; D. 11 or 12; A. 11; scales 11 to 13–55 to 64–5. Eye 1 in snout, 3.25 in head, 1.1 in interorbital, with little difference in different sizes.

Resembling the Cisco of American lakes. Somewhat compressed, the dorsal and ventral profiles equally arched; the ventral surface broad, with a large median series of scales before the ventrals; predorsal area keeled, with a median series of scales from the dorsal to near the occipital process. Occipital process reaching one-seventh the distance to the dorsal; frontal fontanel reaching to above the nares.

Upper jaw considerably projecting; twenty-eight to thirty teeth in the upper jaw. Gill-rakers twenty-six to forty-eight, the longest about one-sixth the length of the eye.

Dorsal pointed, about equal to the length of the head, its origin equidistant from tip of snout and tip of adipose; caudal deeply forked; anal emarginate, the highest ray not reaching the tip of the last; ventrals not reaching anus by about four scales; pectorals not to ventrals by about four scales.

Scales with many vermiculated horizontal striæ; lateral line straight; fins naked, a large axillary scale; exposed edge of the scales of the middle series on the breast four times as wide as the exposed edge of the scales below the dorsal, the scales becoming larger on the second series of scales below the lateral line.

Highly iridescent, coppery below, steel-blue above; each caudal lobe with a black band, the lower one more intense; a circular or oval lateral spot the center of which is over the thirtieth to thirty-third scale; under the lens the caudal peduncle, a downward band in front of dorsal, and the anal are sometimes peppered.

Subfamily Pyrrhulininæ.

Pyrrhulina Cuvier and Valenciennes.

Pyrrhulina Cuvier and Valenciennes, Hist. Nat. Poiss., XIX, 1846, 535, pl. 589.

Holotaxis Cope, Proc. Am. Philos. Soc., XI, 1870, 563.

Type, *Pyrrhulina filamentosa* Cuvier and Valenciennes.

Small fishes. Premaxillary and dentary with two or more series of conical teeth; mouth very oblique.

135. Pyrrhulina filamentosa Cuvier and Valenciennes.

Pyrrhulina filamentosa Cuvier and Valenciennes, Hist. Nat. Poiss., XIX, 1846, 535 (Surinam). Günther, Catalogue, V, 1864, 286 (Essequibo). Steindachner, SB. Akad. Wiss. Wien, LXXII, 1875, (Cayenne). Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 128.

This species is very abundant in all brooks. Judging from the size, it reaches its highest development some distance from the coast.

Thirty-five specimens, 38–86 mm. Aruataima. (C. M. Cat. No. 1893*a–c*; I. U. Cat. No. 12171.)

One hundred specimens, 36–106 mm. Holmia Creek. (C. M. Cat. No. 1894*a–m*; I. U. Cat. No. 12172.)

Fifty specimens, 29–85 mm. Savannah Landing. (C. M. Cat. No. 1895*a–c*; I. U. Cat. No. 12173.)

Four specimens, 36–40 mm. Two hours below Holmia. (C. M. Cat. No. 1896*a–b*; I. U. Cat. No. 12205.)

Seven specimens, 40–57 mm. Tukeit. (C. M. Cat. No. 1897*a–b*; I. U. Cat. No. 12174.)

Two specimens, 38–53 mm. Erukin. (C. M. Cat. No. 1898*a*; I. U. Cat. No. 12175.)

Two specimens, 38–54 mm. Konawaruk. (C. M. Cat. No. 1899*a*; I. U. Cat. No. 12176.)

One specimen, 53 mm. to base of caudal. Wismar. (C. M. Cat. No. 1900*a*.)

Seventy-five specimens, 21–81 mm. Christianburg Canal and small pools. (C. M. Cat. No. 1901*a–j*; I. U. Cat. No. 12177.)

Two specimens, 41–55 mm. Rockstone. (C. M. Cat. No. 1902*a*; I. U. Cat. No. 12178.)

Twenty-two specimens, 39–57 mm. Gluck Island. (C. M. Cat. No. 1903*a–c*; I. U. Cat. No. 12179.)

Fourteen specimens, 61–96 mm. Niekaparoo. (C. M. Cat. No. 1904*a–c*; I. U. Cat. No. 12180.)

Twenty-nine specimens, 40–115 mm. Kumaka. (C. M. Cat. No. 1905*a–c*; I. U. Cat. No. 12181.)

Two specimens, 17 mm. Georgetown trenches. (C. M. Cat. No. 1906*a*; I. U. Cat. No. 12182.)

Forty-one specimens, 33–62 mm. Cane Grove Corner. (C. M. Cat. No. 1907*a–b*; I. U. Cat. No. 12183.)

Five specimens, 37–46 mm. Maduni Creek. (C. M. Cat. No. 1908*a–b*; I. U. Cat. No. 12206.)

One hundred and twenty specimens, 27–75 mm. Lama Stop-Off. (C. M. Cat. No. 1924*a–z*; I. U. Cat. No. 12184.)

One specimen, about 70 mm. Barima River. (C. M. Cat. No. 1909*a*.)

Thirteen specimens, 54–69 mm. Issorora Rubber Plantation. (C. M. Cat. No. 1910*a–c*; I. U. Cat. No. 12185.)

One specimen, 58 mm. Creek in Mora Passage. (C. M. Cat. No. 1911*a*.)

One hundred and twenty-six specimens, the largest 30 mm. Aruka River. (C. M. Cat. No. 1912*a–z*; I. U. Cat. No. 12186.)

Head 4.5–4.66; depth 4.5–5; D. 10; A. 12; scales 22–29 in a longitudinal series, 5.5 between dorsal and ventral. Eye 1 in snout, 3.5 in head, 1.5 in interorbital.

Slender; head broad, flat, scaled to above preopercle; mouth oblique, premaxillaries meeting at an angle; conical teeth along the margin of the maxillary, increasing in size toward the upper angle; two widely separated series of teeth on the premaxillary and the dentary; gill-rakers short and slender.

Scales with radiating striæ; axillary scale small, rounded, the series of scales along the anal bent upward to form a basal sheath; a few irregular scales at the base of the caudal lobes.

Dorsal short and rounded, its height 4.5 to 5 in the length, or lanceolate, the middle rays prolonged in some specimens, one-third of the entire length. Upper caudal lobe much the longer, variable in size, when longest 2.5 in the length; anal rounded, or the middle rays prolonged, 5 or 6 in the length; ventrals not to the anus, or beyond the origin of the anal; pectorals not to the ventrals.

Fins in specimens from Hohnia light geranium-red; caudal yellow; lateral band of the head continued in red on the body. Sides olive-green, with rusty spots.

In the Gluck Island specimens the dorsal is red in front and below, adipose brick-red, caudal greenish yellow, anal orange in front, greenish behind; ventrals and pectorals yellowish, rows of rusty spots in front on lower part of sides. A black band from the chin to the eyes or the opercle, or to a few scales beyond; dorsal with a round black spot to nearly entirely black; anal and ventrals sometimes narrowly margined with black; frequently a dusky predorsal line.

The Kumaka specimens were olive-green with rusty spots, the anal and ventrals margined with dark.

This species—if all the above specimens represent one species—differs greatly in different localities. Specimens from the Guiana plateau, for instance, have a dusky blotch above the pectoral, those in the lowlands do not. Some have the dark band extended to the eye, others to the edge of the opercle, and still others to a short distance behind the opercle. The fins also differ very greatly. A final decision cannot be given as to the identity of the specimens on account of the difference in size in examples coming from different places.

Subfamily Nannostomatinæ.

Nannostomus Günther.

Nannostomus Günther, Proc. Zool. Soc. London, 1872, 146.

Type, *Nannostomus beckfordi* Günther.

Skull truncate; no occipital process; no fontanel, no lateral line; no adipose fin; jaws equal; teeth broad at top, with several points of equal length. Minute fishes.

136. **Nannostomus beckfordi** Günther.

Nannostomus beckfordii Günther, Proc. Zool. Soc. London, 1872, 146 (Gottverwagting Plantation, a short distance east of Georgetown).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 427.

Head 3.6; depth 4.25; D. 8; A. 10; lateral line 22; transverse line 5 between dorsal and ventral.

Body compressed. Eye one-third of the length of the head, and a little longer than the snout. Origin of the dorsal and ventral fins in the middle of the length (without caudal). A silvery band along the middle of the side, bordered above by a reddish, and below by a blackish band. A black spot on the lower half of the gill-cover. Caudal fin red.

Total length 30 mm.

This species is readily distinguished by the dark spot on the lower half of the opercle.

137. **Nannostomus marginatus** Eigenmann. (Plate XXXVI, fig. 4.)

Nannostomus marginatus Eigenmann, Ann. Carnegie Mus., VI, 1909, 41.

Type, 26 mm. Maduni Creek. (Carnegie Museum Catalog of Fishes No. 1171.)

Cotypes, ten specimens, 21–25 mm. Maduni Creek. (C. M. Cat. No. 1172*a–d*; I. U. Cat. No. 11696.)

Cotypes, five specimens, 19–24 mm. Lama Stop-Off. (C. M. Cat. No. 1173*a–b*; I. U. Cat. No. 11697.)

Cotypes, two specimens, 22–23 mm. Crab Falls. (C. M. Cat. No. 1174*a*; I. U. Cat. No. 11698.)

Cotypes, two specimens, 24 mm. Rockstone sand-bank. (C. M. Cat. No. 1175*a*; I. U. Cat. No. 11699.)

Cotypes, five specimens, 25–31 mm. Gluck Island. (C. M. Cat. No. 1176*a–b*; I. U. Cat. No. 11700.)

Cotypes, two specimens, 27–31 mm. Christianburg canal? (C. M. Cat. No. 1177*a*; I. U. Cat. No. 11701.)

Cotypes, nineteen specimens, 21–22 mm. Cane Grove Corner. (C. M. Cat. No. 1178*a–f*; I. U. Cat. No. 11702.)

Most nearly related to *N. trifasciatus* Steindachner.

Head 3.6; depth 3.4; D. 10; A. 11 or 12; five scales between dorsal and ventral, nine or ten before the dorsal, twenty-one in a median lateral series. Eye 3 in the head; snout 4 in the head; interorbital equal to the eye.

Short and chubby, the snout especially short, the jaws equal. Origin of the dorsal over the insertion of the ventrals; pectorals reaching a little more than half-way to the ventrals; ventrals half-way to middle of anal. No adipose fin.

Back chocolate, the median line darkest; three black lateral stripes, a median golden stripe and a golden stripe shading to silvery ventrad; belly white. A crimson spot on the middle of the dorsal and of the ventral fins; a crimson streak bordering the upper margin of the middle black band from above middle of the pectoral to middle of the dorsal; caudal suffused with orange; anal posteriorly orange-red; iris red above.

The upper two black bands converge on the caudal fin, the middle one extends from the end of the snout and mandible to base of the lower caudal lobe, the lowest extends from near the mouth along the suborbital, below the pectoral to the anal, and is continued upon the anterior rays of the anal and sometimes margins the rest of the fin. Anterior dorsal ray, or rays, dark.

138. **Nannostomus minimus** Eigenmann. (Plate XXXVI, fig. 5.)

Nannostomus minimus Eigenmann, Ann. Carnegie Mus., VI, 1909, 41; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 427.

Type, 21 mm. Erukin. (Carnegie Museum Catalog of Fishes No. 1165.)

Cotypes, two specimens, 20 and 21 mm. Erukin. (I. U. Cat. No. 11691.)

Cotype, one specimen, 22 mm. Amatuk. (C. M. Cat. No. 1166*a*.)

Head 3.6; depth 4.66; D. 9; A. 10; seven scales in front of dorsal, five between dorsal and ventrals, twenty-one in a lateral series. Eye greater than snout, 3 in the head; interorbital equal to the eye.

Origin of dorsal over origin of ventrals; pectorals reaching half-way to middle of ventrals; ventrals to anal; origin of anal on a vertical from middle of last dorsal ray. No adipose fin.

Back uniform gray, median darker line wanting; a light band from end of snout to upper part of middle of caudal; a black band from end of mandible to lower part of middle of caudal; darkest above pectorals and above middle of ventrals; a few chromatophores along base and in front of the anal fin; fins mostly hyaline, their chromatophores few.

139. **Nannostomus simplex** Eigenmann. (Plate XXXVI, fig. 6.)

? *Nannostomus anomalum* Steindachner, "Ichthyologische Beiträge," v, 1876, 81 (Rio Negro; Amazon at Obidos).

Nannostomus simplex Eigenmann, Ann. Carnegie Mus., VI, 1909, 42; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 427.

Type, 25 mm. Lama Stop-Off. (Carnegie Museum Catalog of Fishes No. 1167.)

Cotype, 29 mm. Lama Stop-Off. (I. U. Cat. No. 11692.)

Closely allied to *N. aurutus* and *N. minimus*.

Head 3.5; depth 4.5; D. 10; A. 10; five scales between dorsal and ventral, nine before dorsal, twenty-four in a lateral series. Eye a little greater than snout, 3 in the head, equal to the interorbital.

Pectorals reaching half-way to second third of the ventrals, ventrals half-way to tip of last anal ray; origin of anal under tip of last dorsal ray. No adipose fin.

Back dark gray with a median dark line; a light band from snout to base of upper rays of middle of caudal; a black band through mandibles and snout to base of lower caudal, and continued on the two middle rays; ventral surface plain, except for a spot between the tips of the ventrals; chromatophores of the lateral band scattered above the pectorals and above the front part of the anal.

Pœcilobrycon Eigenmann.

Pœcilobrycon Eigenmann, Ann. Carnegie Mus., VI, 1909, 43.

Type, *Pœcilobrycon harrisoni* Eigenmann.

Skull truncate, without a crest; no fontanel; no lateral line; pectorals normal; teeth broad-tipped, five-pointed.

Key to the Guiana Species of Pœcilobrycon.

a. A single dark band from chin to near end of middle caudal ray, a light band above it; back chocolate. **harrisoni.**

aa. A median dorsal and three lateral dark bands..... **trifasciatus.**

aaa. Like *harrisoni*, the chocolate of the back bordered by a darker line, a dark streak from behind the base of the lower pectoral rays to and along base of the anal.....erythrurus.

aaaa. A dark band from snout to and including the lower caudal lobe; an oblique ocellated spot above the middle of the caudal.....ocellatus.

140. **Pœcilobrycon harrisoni** Eigenmann. (Plate XXXVII, fig. 1.)

Pœcilobrycon harrisoni Eigenmann, Ann. Carnegie Mus., VI, 1909, 43; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 427.

Type, 55 mm. Canal at Christianburg. (Carnegie Museum Catalog of Fishes No. 1160.)

Cotypes, two specimens, 45–51 mm. Canal at Christianburg. (I. U. Cat. No. 11709.)

Head 4; depth 5.25; D. 9; A. 10; five scales between dorsal and ventral, twenty-six or twenty-seven in a median series, eleven or twelve in front of the dorsal; eye 3 in the head; upper jaw projecting. Snout very little greater than eye; interorbital a little less than eye.

Adipose well-developed, behind tip of anal; origin of dorsal slightly posterior to that of the ventrals. Pectorals reaching half-way to ventrals; ventrals slightly more than half-way to anal.

Back chocolate; a broad straw-colored band from tip of snout to middle of upper caudal lobe; a narrow black band from tip of mandible through eye along lower part of peduncle to near tip of shortest caudal ray, and a few rays inferior to it. Ventral surface silvery, dotted from midway of the ventrals to the anal, the dots continued over the lateral band above the anal. A spot on either side of snout, the iris dorsad, a line along base of anal, and a streak above and below the caudal band, crimson. An oblique, dotted bar across the yellow lateral band just above tip of pectoral. Last anal rays dark.

Similar to *P. unifasciatus*, in which the color from the dark lateral bands across the back is uniform, *i. e.*, lacking the straw-colored band above the dark band.

Named for Mr. J. B. Harrison, M.A., C.M.G., F.G.S., Government Geologist, Georgetown, British Guiana, who assisted the expedition in various ways.

141. **Pœcilobrycon trifasciatus** (Steindachner). (Plate XXXVII, fig. 2.)

Nannostomus trifasciatus Steindachner, "Ichthyologische Beiträge," v, 1876, 75, pl. 9, fig. 2 (Lagunas of the Amazon near Barra do Rio Negro; Rio Negro; Tabatinga).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 49.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 427.

Pœcilobrycon auratus Eigenmann, Ann. Carnegie Mus., VI, 1909, 44; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 427.

Seventeen specimens, 27–34 mm. Konawaruk. (C. M. Cat. Nos. 1161*a* (type of *P. auratus*) and 1162*a–d*; I. U. Cat. No. 11688.)

Three specimens, 27 mm. Rockstone sand-bank. (C. M. Cat. No. 1163*a*; I. U. Cat. No. 11689.)

Eight specimens, 25–33 mm. Gluck Island. (C. M. Cat. No. 1664*a–b*; I. U. Cat. No. 11690.)

Head 3.75; depth nearly 5; D. 10; A. 11; five scales between dorsal and ventral, twenty-three along a median series, ten in front of dorsal.

Eye 3 in head, a little less than snout, greater than interorbital; upper jaw projecting.

Adipose fin over about middle of last anal ray; dorsal beginning behind the vertical from the origin of the ventrals. Pectorals reaching half-way to middle of ventrals, ventrals half-way to base of last anal ray.

Mid-dorsal line from head to adipose chocolate, on either side of which is a straw-colored stripe, confluent with a median line on the head to the tip of the snout. A similar chocolate stripe on the sides, bounded below by another straw-colored stripe, both concurrent with the back; ventrad of the last is a chocolate band, widest above tips of pectorals, reaching the vanishing point above the eye and below the tip of the dorsal; a golden band from upper part of eye to upper caudal lobe, continued forward of eye as a red streak; a dark brown lateral band from tip of jaws to tip of lower caudal lobe; a horizontal streak below the eye. Some scales below the lateral band with a brown spot; two oblique, black cross-bands, one up and back from last half of pectorals, the other up from before anal. Lower caudal lobe black; base of upper caudal lobe and of anal red; anal blackish. Fins otherwise hyaline.

142. **Pœcilobrycon erythrurus** Eigenmann. (Plate XXXVII, fig. 3.)

Pœcilobrycon erythrurus EIGENMANN, Ann. Carnegie Mus., VI, 1909, 44; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 427.

Type, 33 mm. Rockstone sand-bank. (Carnegie Museum Catalog of Fishes No. 1168.)

Cotypes, seven specimens, 33–37 mm. Rockstone sand-bank. (C. M. Cat. No. 1168*a–b*; I. U. Cat. No. 11693.)

Cotypes, four specimens, 22–27 mm. Gluck Island. (C. M. Cat. No. 1170*a*; I. U. Cat. No. 11694.)

Cotype, one specimen, 22 mm. Amatuk. (C. M. Cat. No. 1187*a*.)

Cotypes, two specimens, 32–33 mm. Rupununi Pan. (C. M. Cat. No. 1188*a*; I. U. Cat. No. 11695.)

Allied to *P. trifasciatus*.

Head 3.75; depth 4.66–4.75; D. 10; A. 9 or 10; five scales between dorsal and ventral, ten before dorsal, twenty-six in a median line. Eye equal to snout and to interorbital, 3.2 in the head; jaws equal.

Dorsal over the vertical from the ventrals; pectorals reaching half-way to middle of ventrals; ventrals half-way to middle of anal; adipose fin a little anterior to the tip of the last anal ray; origin of anal on a vertical from the tip of the last dorsal ray.

Back light brown, margined by a more or less faint darker line; a light streak from snout through top of iris to upper half of middle of caudal; a conspicuous lateral black band from mandible to base of lower caudal lobe, continued on the rays just below the middle; a dark streak from behind the base of the lower pectoral rays to and along base of the anal; middle anal rays dusky. Ventral surface silvery.

In life a blood-red streak borders the superior margin of the black lateral band over the middle of the pectorals; a red spot on basal half of the dorsal, two red spots on base of the caudal, one similar spot on the anal lobe; an orange spot on each ventral fin.

143. **Pœcilobrycon ocellatus** Eigenmann. (Plate XXXVII, fig. 4.)

Pœcilobrycon ocellatus Eigenmann, Ann. Carnegie Mus., VI, 1909, 45; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 427.

Type, 41 mm. Wismar. (Carnegie Museum Catalog of Fishes No. 1179.)

Cotypes, two specimens, 39–41 mm. Wismar. (I. U. Cat. No. 11703.)

Cotypes, seventy-one specimens, 35–43 mm. Rockstone sand-bank. (C. M. Cat. No. 1181*a–j*; I. U. Cat. No. 11704.)

Cotypes, nine specimens, 33–42 mm. Gluck Island. (C. M. Cat. No. 1181*a–c*; I. U. Cat. No. 11705).

Cotypes, eight specimens, 31.5–37 mm. Rupununi Pan. (C. M. Cat. No. 118*a–c*; I. U. Cat. No. 11706.)

Cotype, one specimen, 39 mm. Crab Falls. (C. M. Cat. No. 1183*a*.)

Cotypes, two specimens, 39–42 mm. Tumatumari. (C. M. Cat. No. 1184*a*; I. U. Cat. No. 11707.)

Cotypes, eighteen specimens, 31–43 mm. Konawaruk. (C. M. Cat. No. 1185*a–c*; I. U. Cat. No. 11708.)

Most nearly related to *P. unifasciatus* Steindachner.

Head 4.2–4.4; depth 5.4–5.5; D. 10; A. 10 or 11; five scales between dorsal and ventral, ten before dorsal, twenty-eight along a lateral series. Eye a little shorter than snout, 3.3 in the head, equal to the interorbital. Upper jaw projecting.

Dorsal inserted slightly behind the vertical from the insertion of the ventral; pectorals reaching half-way to second third of ventrals; ventrals half-way to base of last anal ray; adipose fin over middle of last anal ray.

Light brown above, bordered below by a black band from tip of snout and mandible to the end of the lower caudal lobe; the band is widest on the caudal peduncle, where it unites with its fellow of the other side; a bar connects the two lateral bands in front of the anal. Lower parts silvery white. Dorsal hyaline; lower caudal lobe black, obliquely crossed near the center by a red band, and margined with red above; usually a black ocellus-like spot or streak near the middle of the caudal rays near the center of the fin; middle, and sometimes the posterior anal rays, dark. Operele purple.

Archicheir Eigenmann.

Archicheir Eigenmann, Ann. Carnegie Mus., VI, 1909, 46.

This genus is a *Nannostomus* with peculiar pectorals. In *Nannostomus* the pectorals are normal, as in related genera; in this genus they appear to have retained the embryonic structure. They are broad, dermal flaps, with hair-like fringes.

Gill-membranes united, free from the isthmus.

144. **Archicheir minutus** Eigenmann. (Plate XXXVII, fig. 5.)

Archicheir minutus Eigenmann, Ann. Carnegie Mus., VI, 1909, 46; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 428.

Type unique, 26 mm. Canal at Christianburg. (Carnegie Museum Catalog of Fishes No. 1186.)

This species is readily recognizable by the color of the caudal and anal fins.

Head 3.5; depth 5.66; D. 9; A. 11; scales large. Eye 3.5 in the head, considerably greater than the interorbital, but little shorter than the snout.

Origin of dorsal a little posterior to origin of ventrals. Adipose fin considerably behind tip of the anal.

Back chocolate. A light band from end of snout to base of superior caudal lobe; a dark band from end of maxillary to the base of the inferior caudal lobe. A black spot at base of the pectoral, and one before the first ventral ray. Dorsal dusky; adipose black. Middle caudal rays black; an obliqie bar from the edge of base of each lobe to the end of the median black bar, the lowermost one much the widest, the superior bar brown, shading into black at both ends. Anal hyaline, a black bar across tips of its last rays.

It is very probable that the pectoral fin in this specimen is abnormal, and that the genus is a synonym of *Pœcilobrycon*.

Characidium Reinhardt.

Characidium Reinhardt, Overs. Dan. Vidensk. Selsk. Forh., 1866, 56, pl. 2, figs. 1 and 2.

Chorimycterus Cope, Am. Nat., XXVIII, 1894, 67 (*tenuis*).

Nannocharax Boulenger, Boll. Mus. Zool. ed. Anat. Comp. Torino, X, 1895, 2 (*borellii*).

Pœcilosomatops Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 323, fig. 17 (*etheostoma*).

Type, *Characidium fasciatum* Reinhardt.

Premaxillary and dentary each with a single series of conical or three-pointed teeth; no frontal fontanel, a small circular occipital fontanel; a triangular occipital process; adipose fin present; lateral line complete. Small or minute fishes of the sand-bars and cataracts, living among the rocks or burrowing in the sand, much as do the Etheostomatine fishes of North America.

Key to the Guiana Species of Characidium.

a. Tips of outer pectoral rays thickened; color well-developed. (Inhabitants of rocky places and creeks.)

b. A broad lateral band, not crossed by dark bars.....**laterale.**

bb. Lateral band crossed by vertical bars.

c. Pectorals not reaching ventrals; about four lateral bands or streaks, crossed by about eight bars.....**vintoni.**

cc. Nearly uniform blue-black; dorsal, caudal and ventrals conspicuously barred with white and black.....**blennioides.**

ccc. Straw-color, with a narrow black band from tip of snout to base of middle caudal rays, and about ten brown cross-bands.....**fasciatum.**

aa. Tips of outer pectoral rays not thickened; pellucid. (On sand-bars, burrowing.)

d. Middle of sides with twenty-seven to thirty chromatophores, one or more out of line; back with about sixteen cross-bars.....**pellucidum.**

dd. Sides with numerous crescents of brown; back with about thirteen cross-bars.....**pteroides.**

ddd. About ten dark brown cross-bars, most intense on back and along the lateral line, the centers of the scales in the bars colorless.....**catenatum.**

145. **Characidium laterale** Eigenmann. (Plate XXXVII, figs. 6, 7.)

Characidium laterale Eigenmann, Ann. Carnegie Mus., VI, 1909, 36; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 427.

Type, 37 mm. Amatuk. (Carnegie Museum Catalog of Fishes No. 1141.)

Cotypes, three specimens, 29–35 mm. Amatuk. (I. U. Cat. No. 11673.)

A *Zygonectes*-like *Characidium*.

Head 3.75–4; depth 6; D. 11 or 12; A. 8; scales 4–36–2.

Eye equal to snout, 3.75 in head. Teeth three-pointed. Pectoral reaching ventrals, its outer rays thickened; ventrals three-fourths to anal; fourth anal ray

reaching considerably beyond tip of last, but not to the caudal fulcra. Base of dorsal reaching half-way to middle of adipose, about 7 in the length.

A broad band from tip of snout to base of middle caudal rays, bordered by a light streak above; back brown, with darker cross-shades; a small spot just above base of first ventral ray; a dark spot or streak on the chin, another anterior to the anal; a dark spot on either side of base of anal, ventral surface otherwise plain. A dark spot anterior to the dorsal and one in front of the adipose fin. Fins without definite markings.

146. **Characidium vintoni** Eigenmann. (Plate XXXVIII, figs. 1, 2.)
"Tunatruic."

Characidium vintoni Eigenmann, Ann. Carnegie Mus., VI, 1909, 36; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 428.

Type, 76 mm. Shrimp Creek, where the path from Tukeit to the Kaieteur crosses it. (Carnegie Museum Catalogue of Fishes No. 1142.)

Cotypes, fifty-two specimens, 53–82 mm. Shrimp Creek. (C. M. Cat. No. 1143*a–j*; I. U. Cat. No. 11674.)

Named for Mrs. C. Vinton, one of the few ladies who have visited the habitat of this species.

Resembling *Hadropterys*.

Head 4–4.25; depth 5.4–6; D. 11; A. 8; scales 4–37–2½, nine median scales anterior to dorsal; eye 1.66 in the snout, 4.6 in the head, about 1 in the interorbital; bony interorbital equal to half the diameter of eye; teeth obscurely three-pointed.

Snout long, pointed. Pectorals with the tips of the outer rays thickened, not reaching ventrals; ventrals not to anal; highest anal ray equal to length of caudal peduncle, not reaching the fulcra of the caudal; third dorsal ray reaching tip of last; base of dorsal equal to one-half its distance from the adipose fin, about 8 in the length; tip of third dorsal ray reaching much beyond tip of the last ray.

A conspicuous band from the tip of the snout to the middle of the caudal, bordered above by an interrupted yellowish band about half its width; a dark band along the middle of the back, another between it and the lateral band; a dark streak parallel to the lateral band below it in front of the caudal peduncle. About eight bands across the back to the lateral band, sometimes continued below the lateral band directly, or with a shift backward or forward. Lower surface silvery; opercle, angle of preopercle, and a band below the eye sometimes dark; axil and spot above origin of ventrals and a streak along base of anal dark; lower surface of chin pale or dark. All these markings sometimes obscured by increased pigmentation.

Dorsal nearly uniform. Caudal lobes with an oblique black bar; area between this bar and the basal spot of the middle rays pigmentless, faintly dusky posterior to the black bars. Tips of outer rays of pectoral and ventral and the first rays of the anal swollen, these fins hyaline, except for a few color-cells along the middle of the middle rays.

147. **Characidium blennioides** Eigenmann. (Plate XXXVIII, figs. 3, 4.)

Characidium blennioides Eigenmann, Ann. Carnegie Mus., VI, 1906, 27; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 428.

Type, 52 mm. Erukin. (Carnegie Museum Catalog of Fishes No. 1144.)

Cotypes, six specimens, 43–52 mm. Erukin. (C. M. Cat. No. 1145*a–b*; I. U. Cat. No. 11675.)

Cotype, one specimen, 55 mm. Tukeit. (C. M. Cat. No. 1146*a*.)

Cotypes, two specimens. 42–54 mm. Creek above Potaro Landing. (C. M. Cat. No. 1147*a*; I. U. Cat. No. 11676.)

Cotypes, five specimens, 43–49 mm. Tumatumari. (C. M. Cat. No. 1148*a–b*; I. U. Cat. No. 11677.)

Cotypes, twelve specimens, 33–47 mm. Crab Falls. (C. M. Cat. No. 1149*a–b*; I. U. Cat. No. 11678.)

Cotypes, thirteen specimens, 31–60 mm. Amatuk. (C. M. Cat. No. 1150*a–d*; I. U. Cat. No. 11679.)

Resembling *Etheostoma cæruleum*.

Head 3.75–4; depth 4.5–4.75; D. 11; A. 8; scales 4–32 to 34–2; seven median scales anterior to the dorsal; eye 1.1 in snout, 3.75 in head; bony interorbital half the diameter of eye. Teeth three-pointed, the middle point longest.

Pectorals with the tips of the outer rays thickened, reaching ventrals; ventrals to anal; third anal ray reaching fulcra of the caudal, but scarcely beyond the tip of the last ray. Base of dorsal about 1.2 in its distance from the adipose fin, 5.5 in the length; third dorsal ray reaching base of the last.

Adult nearly uniform bluish black, the ventral surface being but little lighter. Margin of adipose and caudal, and outer edges of ventrals and pectorals, white. Dorsal, caudal, anal, and ventrals conspicuously barred with white and black. Pectorals, exclusive of the tips of the outer four rays, bluish black.

Younger specimens and lighter colored ones show about seven cross-bands and more or less incomplete rows of light spots following the rows of scales. A dark band forward from eye; a narrower one downward. In the youngest specimen from Amatuk the pectoral, like the ventral and anal, has four dark bands.[33]

[33] A smaller specimen from this place, 23 mm. long, has a single band on the pectorals and the ventrals. It is crushed and I am not certain of its identification.

148. **Characidium fasciatum** Reinhardt. (Plate XXXIX, figs. 1, 2.)

Characidium fasciatum Reinhardt, Overs. Dan. Vidensk. Selsk. Forh., 1866, 56, pl. 2, figs. 1, 2 (Rio das Velhas).—Lütken, Dan. Vidensk.-Selsk. Skr., (5), XII, 1875, 194, figs. 1, 2; and p. xi (Rio das Velhas).—Steindachner, "Süsswasserfische Südöstlichen Brasilien," iii, 1876, 1 (Rio Parahyba; Rio Piabanha near Petropolis); "Flussfische Südamerika's," i, 1879, 7 (Orinoco near Ciudad Bolivar); "Ichthyologische Beiträge," ix, 1882, 19 (Canelos, Ecuador).—Boulenger, Proc. Zool. Soc. London, 1887, 280 (Sarayacu).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 50.—Eigenmann and Norris, Rev. Mus. Paulista, IV, 1900, 357 (Rio Tieté; Barbatana).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 427.

Characidium zebra Eigenmann, Ann. Carnegie Mus., VI, 1909, 38; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 428.

Seven specimens, 47–55 mm. Maripieru. (C. M. Cat. Nos. 1151 and 1152*a–b*; I. U. Cat. No. 11680.) (Types of *C. zebra*.)

Fourteen specimens, 32–44 mm. Maripieru? (C. M. Cat. No. 1159; I. U. Cat. No. 11687.) (Types of *C. zebra*.)

Head 4.25–4.5; depth 5–5.3; D. 11; A. 7 or 8; scales 4–35 or 36–3½; nine scales before the dorsal. Eye equal to snout, 3.75–4 in the head; bony interorbital 1.3–1.5 in the eye. Teeth three-pointed, the middle point longest.

Pectorals with the tips of the outer rays thickened, reaching ventrals; ventrals not to anal; highest anal ray a little less than the length of the caudal peduncle, reaching a little beyond tip of of the last ray, but not to caudal fulcra; base of dorsal fin reaching over half-way to the adipose, 6 in the length, the third ray extending about half-way to tip of last.

Straw-color; a narrow black band from tip of snout to base of middle caudal rays, where it ends near a small black spot; about ten brown cross-bands, the fifth encircling the entire body at tips of ventrals in the type; these bands sometimes becoming double along the sides, giving the appearance of many narrow bands. Back dusky, the centers of the scales light. Opercle and lower lip dark. Ventral surface colorless. Dorsal with a spot behind and near the base of each ray, beginning with the fourth; chromatophores along the branched part of the rays; other fins hyaline, without distinct markings.

149. **Characidium pellucidum** Eigenmann. (Plate XXXIX, figs. 3–5.)

Characidium pellucidum Eigenmann, Ann. Carnegie Mus., VII, 1910, 39; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 428.

Type, 39 mm. Gluck Island. (Carnegie Museum Catalog of Fishes No. 1156.)

Cotype, 37 mm. Gluck Island. (I. U. Cat. No. 11683.)

Resembling *Ammocrypta pellucida*.

Head 4.33; depth 7; D. 11; A. 8; scales 3–36–2, nine in front of dorsal. Eye a little longer than snout, 3.75 in head; bony interorbital a little less than half the length of head. Teeth with three large points.

Pectorals reaching ventrals, the outer rays not thickened; ventrals not to anal; anal rounded, the third ray reaching a little beyond tip of last, but not nearly to caudal; dorsal truncate the third ray reaching a little beyond middle of last; base of dorsal 6.75 in the length, equal to one-half its distance from tip of adipose.

Pellucid in life. Middle of sides with twenty-seven to thirty stellate chromatophores, one or more of which may have slipped up or down from the line of the rest; a few smaller cells dorsad of the lateral series; back with about sixteen crossbars, which do not encroach on the sides. A dark band forward from eye to end of snout. Upper part of cheek and opercle each with a chromatophore; top of head with a few chromatophores; ventral parts clear, except for a patch of chromatophores between the pectorals, one between the ventrals, and a patch at origin of anal; a dark median line between tip of ventral and another behind the anal fin. A dark band about two-thirds up on the dorsal and one across base of the anterior rays, both very faint; caudal with a few faint dark spots; fins otherwise hyaline.

150. **Characidium pteroides** Eigenmann. (Plate XXXIX, figs. 6, 7.)

Characidium pteroides Eigenmann, Ann. Carnegie Mus., VI, 1909, 40; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 428.

Type, 28 mm. Konawaruk. (Carnegie Museum Catalog of Fishes No. 1157.)

Cotypes, two specimens, 25–27 mm. Konawaruk. (I. U. Cat. No. 11684.)

Cotype, one specimen, 23 mm. Rockstone. (C. M. Cat. No. 1158.)

Cotype, one specimen, 24 mm. Wismar. (I. U. Cat. No. 11685.)

A characin which burrows in the sand, very similar to *C. pellucidum*.

Head 4; depth 6; D. 11; A. 7; scales 4–36–2. Eye considerably longer than snout, a little over 3 in the head; teeth three-pointed.

Pectorals about reaching ventrals, the tips of their outer rays not thickened; ventrals not nearly to anal; anal rounded, not nearly reaching the caudal fulcra. Third dorsal ray reaching about to second third of the last; base of dorsal 1.3 in its distance from the adipose, 6 in the length.

Hyaline. Sides with numerous crescents of brown; back with about thirteen cross-bars made up of crescents; in places two opposing crescents form ocelli. A dark band from eye to end of snout; a black bar through the operele; a deep-seated spot on angle of preoperele; a streak, sometimes broken, backward from eye; an interrupted black line along the ventral surface, concentrated between the ventrals and in front of the anal. Faint markings on dorsal, caudal, and anal; fins otherwise hyaline.

151. **Characidium catenatum** Eigenmann. (Plate XXXVIII, figs. 5, 6.)

Characidium catenatum Eigenmann, Ann. Carnegie Mus., VI, 1909, 40; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 428.

Type, 38 mm. Warraputa. (Carnegie Museum Catalog of Fishes No. 1153.)

Cotypes, twelve specimens, 32–35 mm. Rockstone sand-bank. (C. M. Cat. No. 1154*a–d*; I. U. Cat No. 11681.)

Cotypes, two specimens, 37–38 mm. Crab Falls. (C. M. Cat. No. 1155*a*; I. U. Cat. No. 11682.)

A sand-burrowing characin, resembling *Ammocrypta pellucida*. It stands alone among the species from Guiana in having single-pointed, strictly conical teeth, approaching in this respect *Pyrrhulinus*.

Head 4–4.2; depth 6–6.2; D. 10 or 11; A. 8; scales 4–38–3, ten before the dorsal. Eye a little longer than snout, 3.3 in head; bony interorbital about 2 in eye. Teeth conical.

Pectorals reaching ventrals or not, the tips of the outer rays not thickened; ventrals not to anal; anal rounded, the fifth ray highest, reaching slightly beyond tip of last, not nearly to caudal; dorsal low, subtruncate, the third ray not quite reaching tip of last; base of dorsal extending half-way to tip of adipose, 7.75 in the length.

Pellucid in life. Sides of head and body more or less iridescent; a dark stripe from eye to end of snout; about ten dark brown cross-bars, most intense on back and along the lateral line; the centers of the scales of the bars colorless, giving each band a chain-like appearance; a few chromatophores on the margins of other dorsal scales. A minute, round black spot at base of caudal, surrounded by a hyaline area, which is bounded posteriorly by a faint color-halo; fins otherwise all hyaline. A blackish median line from behind ventrals to the vent.

Subfamily Anostomatinæ.

Anostomus Gronow.

Anostomus Gronow, Mus. Ichth., II, 1754, 13, pl. 7, fig. 2.—Scopoli, Intr. Hist. Nat., 1777.

Pithecocharax Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 320.

Type, *Salmo anostomus* Linnæus.

Small to medium-sized fishes, with the snout subcircular in cross-section; the mouth minute, vertical; the lips thick, plicate; about eight teeth in each jaw, bifid or multilobed incisors; the gill-membrane united with the isthmus.

Key to the Guiana Species of Anostomus.

a. Dark brown, with two conspicuous light bands: one from mouth along upper margin of eye to upper caudal lobe, one along lower margin of eye to lower caudal lobe; a fainter band from the nape to behind the dorsal on either side of the median line, a similar one from below pectoral to anal, and another along the midventral line. Brilliant in life..... **anostomus.**

aa. Sides with spots.

b. A black spot below the dorsal, and another at the base of the middle caudal rays, sometimes another on the fourth scale of the lateral line; each scale of the lower part of the sides with a median dark brown streak. Backs of small, light-colored individuals with about fifteen wavy cross-bands, which may be obscured. Origin of dorsal nearer snout than to base of caudal; preorbital and postorbital portion of head about equal..... **trimaculatus.**

bb. Spots as under *b*, an additional one above anterior part of anal; cross-bands broader; scales of the upper part of the sides with an iridescent spot.. Origin of dorsal equidistant from tip of snout and base of middle caudal rays. Snout longer than postorbital portion of head..... **plicatus.**

152. Anostomus anostomus (Linnæus). (Plates XL and XLI, fig. 1.)

Anostomus Gronow, Mus. Ichth., II, 1754, 13, pl. 7, fig. 2.

Salmo anostomus Linnæus, Syst. Nat., ed. 10, I, 1758, 312, No. 24; ed. 12, I, 1866, 514.—Gmelin, Syst. Nat., I, iii, 1788, 1387, No. 29.

Leporinus anostomus Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 38.

Anostomus anostomus Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 50.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia. III, 1910, 425.

Anostomus salmoneus Gronow, Cat. Fish, ed. Gray, 1854, 153.—Günther, Catalogue, V, 1864, 303 (Essequibo).—? Steindachner, "Flussfische Südamerika's," ii, 1881, 40 (Jutahy).—Garman, Bull. Essex Inst., XXII, 1890, 17.

Nine specimens, 55–94 mm. Crab Falls. (C. M. Cat. No. 1852*a–b*; I. U. Cat. No. 12140.)

Eight specimens, 64–95 mm. Tumatumari, above and below the fall. (C. M. Cat. No. 1853*a–b*; I. U. Cat. No. 12141.)

Four specimens, 84–107 mm. Creek below Potaro Landing. (C. M. Cat. No. 1854*a*; I. U. Cat. No. 12142.)

One specimen, 90 mm. Kangaruma. (C. M. Cat. No. 1855*a*.)

Eight specimens, 65–122 mm. Erukin. (C. M. Cat. No. 1856*a–b*; I. U. Cat. No. 12143.)

Two specimens, 54–70 mm. Amatuk. (C. M. Cat. No. 1857*a*; I. U. Cat. No. 12144.)

Head 4–4.4; depth 4.5–5; D. 12; A. 10; scales 4–39 or 40–3.5. Eye 4 in head, 1.5 in snout, 1.4–1.75 in interorbital.

Slender; dorsal and ventral outlines about equally curved, the width 1.75 in the depth; snout subcircular in section, turned upward slightly; mouth vertical, the margin of the upper lip sloping backward slightly. A frontal fontanel extending to above middle of the eye, the parietal fontanel obliterated, but the bones not united in a specimen 115 mm. long. Four teeth in each premaxillary, the outermost one four-lobed, the rest three-lobed; four teeth in each dentary, the outermost one three-lobed, the middle ones bifid.

Dorsal rounded, its highest ray 5.5 in the length, its origin nearer tip of adipose than to snout; caudal deeply forked, the lobes nearly equal, about 4 in the length; anal emarginate, the tip of the first ray reaching beyond the tip of the last; ventrals reaching about half-way to anal; pectorals not quite half-way to middle of ventrals.

Dark brown, with four light lateral bands, dull yellow in life, of which the two median bands are much the most conspicuous, one reddish from the mouth to the eye, which it margins dorsad, continuing to the upper caudal lobe, and one along the lower margin of the eye to the lower caudal lobe; of the less conspicuous bands one begins at the middle of the eye, running along the first row of scales from the median dorsal series, the other begins below the pectoral and extends to the anal. There is a midventral yellowish stripe. Dorsal and caudal intense translucent crimson, fading out toward the tips of the fins; indefinite spots of the same color on the anal and ventrals.

The color differs much in brilliancy and intensity in different individuals.

153. Anostomus trimaculatus (Kner). (Plate XLI, fig. 2.)

Schizodon trimaculatus Kner, "Familie der Characinen," i, 1859, 25, pl. 6, fig. 12 (Matto Grosso).—Cope, Proc. Am. Philos. Soc., XVII, 1878, 690 (Peruvian Amazon).

Anostomus trimaculatus Günther, Catalogue, V, 1864, 304.—Garman, Bull. Essex Inst., XXII, 1890, 17 (Gurupa).—Eigenmann and Eigenmann, Proc. U. S.

Nat. Mus., XIV, 1891, 50.—Pellegrin, Bull. Mus. d'Hist. Nat., V, 1899, 406 (Manaos).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 425.

Pithecocharax trimaculatus Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 320 (Peruvian Amazon).

Two specimens, 116–124 mm. Twoca Pan. (C. M. Cat. No. 1858; I. U. Cat. No. 12145.)

Three specimens, 67 to about 111 mm. Crab Falls. (C. M. Cat. No. 1859; I. U. Cat. No. 12146.)

One specimen. 72 mm. Rockstone. (C. M. Cat. No. 1860.)

Head 4–4.5; depth 3.7–4; D. 12; A. 10 or 11; scales 5–42 to 44–4.5; eye 3.6 in head, 1.25 in snout, 2 in interorbital; 3.2, 1.2, and 1.25, respectively, in a small specimen.

Comparatively heavy, the width equal to half the depth; profile sharply depressed from the nape to the snout; snout comparatively short, subelliptical in cross-section, the interorbital broad; opercle striate.

Four teeth on each side of each jaw, the outer tooth of the lower jaw four-pointed, the next three-pointed, the inner bifid; those of the upper jaw all three-pointed.

Dorsal rounded, its longest ray 5 in the head, its origin nearer tip of adipose than to snout; caudal deeply forked, the upper lobe longest, 3.5 in the length; anal truncate, the tips of all the rays reaching the same point when depressed; ventrals reaching half-way or a little more than half-way to anal; pectorals about half-way to middle of anal.

Light or dark brown. A large, subcircular, faintly ocellated spot on the middle of the sides below the posterior half of the dorsal; a similar, but smaller, spot at the base of the middle caudal rays; sometimes a small spot on the front scales of the lateral line; opercle dark; each scale of the lower part of the sides with a dark spot or streak, the spots forming series; light-colored specimens with five dark wavy lines across the back in front of the dorsal, and about ten similar ones under and behind the dorsal, becoming broader and diffuse toward the caudal. Fins reddish in life.

154. **Anostomus plicatus** sp. nov. (Plate XLI, fig. 3.)

Type, 86 mm. Crab Falls. (Carnegie Museum Catalog of Fishes No. 1861.)

Cotypes, two specimens, 77–89 mm. Crab Falls. (I. U. Cat. No. 12148.)

Cotypes, two specimens, 102–104 mm. Bartica. (C. M. Cat. No. 1862*a*; I. U. Cat. No. 12149.)

Cotypes, two specimens, 72–77 mm. Amatuk. (C. M. Cat. No. 1863*a*; I. U. Cat. No. 12150.)

Cotypes, two specimens, 78–90 mm. Tumatumari. (C. M. Cat. No. 1864*a*; I. U. Cat. No. 12151.)

Very similar to *A. trimaculatus*, but the snout longer and slenderer, the lips more prominent, and the color different.

Head 3.4–3.5; depth 3.3–4; D. 12; A. 10; scales 5–39 or 40–4. Eye 1.75 in snout, 4 in head, 1.5 in interorbital; 1.5, 3.5, 1.1, respectively, in a specimen 77 mm. long.

Width about half the depth; dorsal profile convex to the nape, thence very concave to the very prominent lips; snout subcircular in cross-section, much longer than the post-orbital part of the head; opercle faintly striate in the largest.

Four teeth on each side of each jaw; the two lateral teeth of the lower jaw tricuspid, the middle ones truncate; the two outer ones of the upper jaw tricuspid, the middle ones bifid, the two points frequently unequal.

Dorsal rounded, its highest ray 5.75–6 in the length; its origin equidistant from tip of snout and base of middle caudal rays; caudal deeply forked, its upper lobe about 4 in the length; anal slightly emarginate, the longest ray reaching the tip of the last; ventrals reaching about half-way to middle of anal, pectorals more than half-way to ventrals.

Light brown to nearly black; four spots along middle of sides, the first on and below the fourth scale of the lateral line, the second from the fifteenth or seventeenth scale, the third on the twenty-sixth and twenty-seventh, the last at the end of the line. About twelve cross-bars, not evident on dark individuals, the part of the bars below the lateral line shifted forward or backward. Iridescent spots on the scales.

Schizodon Agassiz.

Schizodon Agassiz, Selecta Gen. et Spec. Pisc. Bras., 1829, 66, pl. 36.

Type, *Curimatus fasciatus* Spix.

Like *Anostomus*, but with the mouth terminal, the snout not produced, elliptical in cross-section; lower teeth short and broad.

155. Schizodon fasciatus (Spix).

Curimatus fasciatus Spix, Selecta Gen. et Spec. Pisc. Bras., 1829, pl. 36.

Schizodon fasciatus Agassiz, Selecta Gen. et Spec. Pisc. Bras., 1829, 66.—Schomburgk, Fishes Brit. Guiana, I, 1841, 252, pl. 26 (Rio Branco).—Müller and Troschel, Horæ Ichth., I, 1845, 10, pl. 1, figs. 5–5*a*; in Schomburgk, Reisen,

III, 1848, 634 (Rupununi; Takutu; Rio Branco).—Kner, "Familie der Characinen," i, 1859, 23 (Rio Negro and Cujabá).—Cope, Proc. Am. Philos. Soc., XI, 1870, 566 (Pará); XVII, 1878, 689 (Peruvian Amazon; Pará; Ambyiacu).—Eigenmann and Ogle, Proc. U. S. Nat. Mus., XXXIII, 1907, 7 (Pará; Bolivar).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 425.

Anostomus fasciatus Günther, Catalogue, V, 1864, 304 (British Guiana; Caracas).—Steindachner, "Flussfische Südamerika's," iv, 1882, 12 (Huallaga).—Cope, Proc. Acad. Nat. Sci. Phila., 1871, 258 (Ambyiacu).—Garman, Bull. Essex Inst., XXII, 1890, 21 (Coary; Dutch Guiana; Hyamary; Içа; José Fernandez; Jutahy; Lakes Alexo, Hyavary, Saraca, Manacapurú, Manaos; Obidos; Rio Puty; São Paolo; Serpa; Tabatinga; Teffé; Tonantins; Villa Bella).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 50.—? Perugia, Ann. Mus. Genova, (2 *a*), X, 1891, 40 (Candelaria.)—Pellegrin, Bull. Mus. d'Hist. Nat., V, 1899, 406 (Manaos).

One specimen, 141 mm. Rupununi Pan. (C. M. Cat. No. 1865*a*.)

Two specimens, 168–174 mm. Twoca Pan. (C. M. Cat. No. 1866*a*; I. U. Cat. No. 12147.)

Head 4.66; depth 4; D. 12; A. 10 or 11; scales 4 or 4.5–43 or 44–4; eye 1.25 in snout, 3.5 in head, 2 in interorbital.

Elongate, the width a little more than half the depth. Dorsal and ventral profiles nearly equally arched; a just perceptible or no depression over the eyes; head broad, the mouth very small, terminal, its width equal to the eye; a regular median series of scales in front of the dorsal and along the midventral line.

Four multicuspid, black-tipped, graduated teeth on each jaw, those of the upper jaw forming an open crescent.

Dorsal obliquely rounded, its longest ray 4.33 in the length, its origin equidistant from tip of snout and origin of adipose. Caudal deeply forked, the upper lobe 4.5 in the length; anal squarely truncate when open, the tip of the first rays reaching far beyond the tip of the last when closed; ventrals reaching half-way to anal; pectorals about half-way to second third of ventrals.

Dark above, white or yellow below. Opercle dark; a series of four dark cross-bands and a small spot at the base of the middle caudal rays; lower caudal lobe margined with dark.

Schizodontopsis Garman.

Schizodontopsis Garman, Bull. Essex Inst., XXII, 1890, 16 (*tæniatus*).

An Anostomatine genus with the mouth small, very obliquely directed upward;

upper jaw with eight teeth in a crescent, the middle ones broad, bilobed, or squarely truncate in the adult, the lateral ones rapidly smaller, obscurely trilobed; lower jaw with similar teeth, more distinctly directed forward, much as in *Leporinus*; gill-membrane joined to the isthmus; postventral area with an obscure median keel; preventral area in the adult with a median and two lateral keels or angles, the preventral surface to the base of the pectoral being covered with three series of scales.

In the young the teeth of the upper jaw have several points, and the ventral keels are not evident; the gill-membrane may also form a narrow free fold across the isthmus in the young.

156. **Schizodontopsis laticeps** sp. nov. (Plate XLI, fig. 4.)

Type, 264 mm. Crab Falls. (Carnegie Museum Catalog of Fishes No. 1825.)

Cotypes, two specimens, 96–240 mm. Crab Falls. (I. U. Cat. No. 12116.)

A fourth small specimen of this species was taken by Mr. Ellis on Gluck Island.

Head 4.2; depth 3–3.16 (4 in young); D. 12 or 13; A. 11 or 12; scales 6–42–4 or 5; eye 1.25 in snout, 3.3–3.5 in head, 2 in interorbital in the adult.

Heavy, the width not quite half the depth; profile arched, comparatively steep, with a slight depression over the eyes; belly with a blunt median keel; two similar lateral keels in front of the ventrals; predorsal region rounded; head broad, somewhat depressed, its width at the anterior margin of the eye equal to its depth at the same point; interorbital convex; width of mouth greater than the length of the orbit; mouth oblique, the lower jaw projecting.

The teeth of the upper jaw graduated, the middle ones broad-lobed incisors, arranged in a crescent; teeth of the lower jaw similar to those of the upper.

Dorsal subtruncate, rounded in the young, its highest ray about 4.5 in the length; its origin a trifle nearer snout than to tip of adipose; caudal broad, leathery in the adult, the upper lobe not greatly longer than the lower, about 4.5 in the length (4 in the young); anal truncate, the first rays not reaching tip of last, not reaching caudal; ventrals not reaching half-way to anal (just half-way in the young); pectorals more than half-way to middle of ventrals.

Ashy gray; a broad obscure band from the dorsal, narrowing to the ventrals; a narrower cross-shade above middle of pectorals and in front of anal; adipose, anal and axil dark. Young with a black band from the chin to the eye and middle of caudal.

Leporinus Spix.

Leporinus Spix, Selecta Gen. et Spec. Pisc. Bras., 1829, 65 (*novemfasciatum*).

Abramites Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 331 (*hypselonotus*).

Type, *Leporinus novemfasciatus* Spix.

Head small, conical, the mouth minute, with a few (four to six) teeth in each jaw, directed obliquely forward toward the middle, obliquely truncate or lobed; gill-openings joined to the isthmus.

The members of the genus are abundant about the rocks and cataracts, and are difficult to catch in the usual ways.

KEY TO THE GUIANA SPECIES OF LEPORINUS.

a. A median lateral band reaching from the gill-opening to the caudal, another curving from the eye downward and back to the lower edge of the caudal..... **arcus.**

aa. An incomplete lateral band or series of median spots.

b. Lateral band beginning under the dorsal and extending to the caudal; lower sides plain... **nigrotæniatus.**

bb. Sides with a median series of spots.

c. First spot most conspicuous, under the dorsal; two spots behind it obscurely connected by a stripe in the young; sometimes one or both of the latter absent; lateral line 38–40*.. **friderici.**

cc. Spots as under *c*, but with other spots below, above and in front of them; lateral line 33–34.

d. Mouth inferior; three teeth in each side of each jaw..... **maculatus.**

dd. Mouth terminal; four teeth in each side of each jaw..... **granti.**

aaa. Sides with vertical bands.

c. Sides with seven bands, four broad ones and three narrower ones in the interspaces..... **alternus.**

cc. Sides with ten bands in the adult, united in pairs in the young, conspicuous in the young, becoming indefinite with age..... **fasciatus.**

157. **Leporinus arcus** sp. nov. (Plate XLII, fig. 3.)

"Tumany" of the Indians.

Type, 206 mm. Tukeit. (Carnegie Museum Catalog of Fishes No. 1832.)

Cotypes, two specimens, 397–400 mm. Tukeit. (C. M. Cat. No. 2296; I. U. Cat. No. 12122.)

Three specimens, 64–104 mm. Creek below Potaro Landing. (C. M. Cat. No. 1829*a*; I. U. Cat. No. 12119.)

One specimen, 49 mm. Tumatumari. (C. M. Cat. No. 1830*a*.)

One specimen, 50 mm. Locality? (I. U. Cat. No. 12120.)

Two specimens, 59–102 mm. Amatuk. (C. M. Cat. No. 1831*a*; I. U. Cat. No. 12121.)

Head 3.5–4; depth 3+ ; D. 12; A. 10 or 11; scales 4–36 or 37–4; eye 2.5 in snout, 5.5 in head, 3 in interorbital in the largest; 1 in snout, 3 in head, 1.25 in interorbital in a specimen 64 mm. long.

Robust, the width a little more than half the length in the adult. Predorsal and preventral areas broadly rounded. Snout conical; interorbital very convex

*In the young of *friderici* the "spots" appear as a band in process of breaking up into spots. *Mrs. C. H. Eigenmann.*

in the adult; mouth terminal in the young, slightly oblique, becoming subterminal or inferior with age. Four teeth on each side of each jaw.

Origin of dorsal equidistant from snout and base of upper caudal lobe in the young, farther forward in adult; margin of dorsal rounded, the highest ray about 5 in the length; upper caudal lobe but little longer than lower, 3.33–3.5 in the length; anal emarginate, not reaching caudal; ventrals reaching half-way to origin or end of base of anal; pectorals a little more than half-way to middle of ventrals.

A conspicuous, straight, dark chocolate band from upper part of gill-opening to base of middle caudal rays, as deep as the eye or deeper; a narrower, similarly colored band arched from the eye downward and back along the lower margin of the caudal peduncle to the caudal; a similar one curving upward slightly from above the gill-opening to the adipose, bordered above by a faintly lighter area; the middle of the back and base of last anal rays dark. A dark spot at base of pectorals.

Tips of fins, bases of scales in the light areas of the sides, opercles, and cheeks rosy or red in the adult. Light parts white to straw-color; gill-covers greenish yellow; in the young the bases of all the fins are sometimes rusty.

158. **Leporinus nigrotæniatus** (Schomburgk). (Plate XLII, figs. 1, 2.)

Chalceus nigrotæniatus Schomburgk, Fishes Brit. Guiana, I, 1841, 213, pl. 13, fig. 2 (Rio Negro).

Leporinus nigrotæniatus Müller and Troschel, Horæ Ichth., I, 1845, 11, pl. 1, fig. 7; in Schomburgk, Reisen, III, 1848, 634 (Pomeroon).—Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 32 (Pedrero on the Rio Negro).—Kner, "Familie der Characinen," i, 1859, 34 (Barra do Rio Negro; Rio Branco).—Günther, Catalogue, V, 1864, 309 (Essequibo).—Steindachner, "Ichthyologische Beiträge," v, 1876, 62 (middle course of the Amazon).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 51.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 426.

Leporinus margaritaceus[34] Günther, Catalogue, V, 1864, 309 (Brit. Guiana).

Six specimens, 120–207 mm. Tumatumari. (C. M. Cat. No. 1820*a*; I. U. Cat. No. 12112.)

One specimen, 145 mm. Rockstone. (C. M. Cat. No. 1821.)

[34] Type, 177 mm. to the base of the middle caudal rays. British Museum. British Guiana, Schomburgk.

Head 4.66; depth 5.16; D. 12; A. 10; scales 5.5–40–5. Eye 1.5 in snout, 3.8 in head, 1.6 in interorbital.

Resembling *nigrotæniatus* in shape; dorsal 5 in the length, its origin equidistant from snout and adipose; anal rounded, reaching the caudal. A silvery lateral band, each scale with a pearly base. No black spots or other dark markings.

Another specimen in the Berlin Museum, in which the lateral band is almost faded out, leaves no doubt but that *margaritaceus* is simply a faded specimen of *nigrotæniatus*.

Two specimens, 128–131 mm. Gluck Island. (C. M. Cat. No. 1822; I. U. Cat. No. 12113.)

Twenty-eight specimens, 66–203 mm. to end of middle caudal rays. Crab Falls. (C. M. Cat. No. 1823*a–c*; I. U. Cat. No. 12114.)

Eleven specimens, 45–191 mm. Bartica. (C. M. Cat. No. 1824*a–c*; I. U. Cat. No. 12115.)

Head 4–4.75; depth 4.5–5; D. 12–13; A. 10 or 11. Scales 5 or 6–41 or 42–4; eye 1.5–1.75 in snout, 3.6–4 in head, 1.2–1.66 in interorbital.

Elongate, subterete, little compressed, head subconical; back little raised, the profile with a scarcely perceptible depression over the eyes. Snout blunt, the mouth inferior, four teeth on each side of each jaw.

Dorsal 5.3–6 in the length, its origin equidistant from tip of snout and end of base of adipose, or a little farther back; margin of dorsal rounded; adipose fin well-developed; caudal forked, the upper lobe longer, 4.3 in the length; anal rounded or truncate, the longer rays always reaching beyond the tips of the shorter rays, sometimes to the lower caudal fulcra; ventrals reaching a little more than half-way to the vent; pectorals half-way to second third of ventrals.

Young with twelve dusky bars across the back; an intense spot behind the middle of the opercle, three similar but successively fainter spots following it; a median dark stripe from below the middle of the dorsal to the caudal, widest and most intense in front. All the markings (with the exception of the lateral stripe) fading with age. Center of adipose orange in life.

159. **Leporinus friderici** (Bloch). (Plate XLIII, fig. 4.)

Salmo friderici Bloch, Ausl. Fische, VIII, 1795, 78, pl. 378 (Surinam).—Bloch and Schneider, Syst. Ichth., 1801, 403.

Leporinus friderici Müller and Troschel, Horæ Ichth., I, 1845, 11; in Schomburgk, Reisen, III, 1848, 634 (Pomeroon).—Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1859, 25 (Essequibo; Surinam; San Francisco; La Plata).—Kner, "Familie der Characinen," i, 1859, 34 (Rio Branco).—Günther, Catalogue, V, 1864, 306 (Essequibo; River Cupai); Proc. Zool. Soc. London, 1868, 244 (Xeberos).—Steindachner, "Süsswasserfische d. Südöstlichen Brasilien," ii, 1875, 13 (Bahia; S. Gonçallo; Rio Pará; Porto do Moz; Parahyba; Rio Branco; Manacapuru; Jatuarana; Essequibo).—Cope, Proc. Am. Philos. Soc., XVII, 1878, 690 (Peruvian Amazon).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 51.—Perugia, Ann. Mus. Genova, (2), XVIII, 1897, 25 (Alto Beni).—Boulenger, Boll. Mus. Torino, XIII, 1898, 4 (Rio Vinces);

XXV, 1900, — (Urucum).—Pellegrin, Bull. Mus. d'Hist. Nat., V, 1899, 406 (Manaos).—Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 328 (Pebas; Peruvian Amazon).—Eigenmann and Ogle, Proc. U. S. Nat. Mus., XXXIII, 1907, 7 (Paraguay).—Eigenmann, Ann. Carnegie Mus., IV, 1907, 125 (Puerto Max); Repts. Princeton Univ. Exp. Patagonia, III, 1910, 426.

? *Curimatus frederici* Perugia, Ann. Mus. Genova, (2 *a*), X, 1891, 41 (Candelaria). —Lahille, Rev. Mus. la Plata, VI, 1895, 7 (Puerto Viejo; Punta Lara).

Curimatus acutidens Valenciennes, in d'Orbigny, Voy. Am. Mer., V, ii, 1847, 9, pl. 8, fig. 1 (La Plata).

Leporinus leschenaulti Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 30, pl. 635 (Maná).—Günther, Catalogue, V, 1864, 307 (Andes of western Ecuador; River Capin).—Peters, MB. Akad. Wiss. Berlin, 1877, 472 (Calabozo).—Perugia, Ann. Mus. Genova, (2 *a*), X, 1891, 41 (Villa Maria, Rio Paraguay, Matto Grosso).—Pellegrin, Bull. Mus. d'Hist. Nat., V, 1899, 157 (Apuré).

Leporinus megalepis Günther (in part, *i. e.*, specimens *e*, *f*, and *m*), Catalogue, V, 1864, 307 (Surinam).

Twenty-one specimens, 98–259 mm. Tumatumari, above, below, and in the falls. (C. M. Cat. No. 1840*a–d*; I. U. Cat. No. 12130.)

Four specimens, 75 to about 290 mm. Rockstone. (C. M. Cat. No. 1841; I. U. Cat. No. 12131.)

Nine specimens, 122–272 mm. Crab Falls. (C. M. Cat. No. 1842*a–b*; I. U. Cat. No. 12132.) (figure.)

Two specimens, 194–195 mm. Kangaruma. (C. M. Cat. No. 1843*a*; I. U. Cat. No. 12133.)

Six specimens, 147–293 mm. Wismar. (C. M. Cat. No. 1844*a*; I. U. Cat. No. 12134.)

Six specimens, 146–208 mm. Mud-flats below Wismar. (C. M. Cat. No. 1845*a*; I. U. Cat. No. 12135.)

Forty-four specimens, 77 to about 345 mm. Bartica, rocks. (C. M. Cat. No. 1846*a–k*; I. U. Cat. No. 12136.)

Head 3.75–4; depth 3.25–3.5; D. 12 or 13; A. 10 or 11. Scales 5–38 to 40–4 or 5; eye 1.25–1.66 in snout, 3.8–4 in head, 2 in interorbital.

Compressed, deep, head somewhat wedge-shaped; profile steep; a scarcely perceptible depression over the eyes; mouth subterminal, four teeth on each side of each jaw.

Origin of dorsal nearer adipose than to tip of snout; margin of dorsal rounded,

its highest ray about 4.5 in the length; caudal broad, leathery, the upper lobe longer, 4 in the length; anal obliquely truncate, the longest rays reaching caudal, ventrals reaching more than half-way to vent, pectorals half-way to middle of ventrals.

Bases of all the scales of the side and back dark, the extent of the dark area variable; a median dark band along the sides from below the posterior half of the dorsal to the caudal in the young, the band becoming broken into two or three spots with age; the spot under the dorsal most intense, the one on the base of the middle caudal rays small, frequently absent; a spot midway between the two is also absent at times. Young with a dark spot below the second and third scale of the lateral line, and a series of three fainter ones with cross-shades following it.

In life the bases of the scales below the lateral line and in front of the lateral spot are reddish, the bases of the rest yellowish; pectorals faintly yellow; opercle and a streak to the nares golden.

I have some evidence that I have obtained from Guiana two species of *Leporinus* with spots on the sides. I must, however, leave the final determination of this point till the revision of the genus is undertaken.

Provisionally I may record the following specimen as belonging to the second species.

One specimen, 64 mm. Tumatumari. (C. M. Cat. No. 2214, Plate XLIII, fig. 4.)

Compared with a specimen 75 mm. long referred to *friderici* from the same place we find the following:

75 mm.

Depth 3.33.

Anterior anal ray reaching beyond tip of last.

D. 13; A. 10.

Head 3.66.

Scales 5–37–5.

A dark spot below the second and third scales of the lateral line; three fainter vertical spots below the sixth, eighth, and tenth scales of the lateral line respectively; an oval spot including the thirteenth to seventeenth scales of the lateral line, a second one including the

64 mm.

Depth 3.

Anterior anal ray reaching tip of last.

D. 12; A. 10.

Head 3.5.

Scales 5–37–5.

A spot on the second scale of the lateral line; a larger spot on the thirteenth to sixteenth scales, a third on the twenty-fifth to twenty-sixth, a fourth on the last three scales; no lateral band.

twenty-fifth to twenty-eighth, a third on the thirtieth to thirty-second, and a dark spot on the base of the caudal; a faint band from the thirteenth scale to the end of the lateral line.

The lateral band and unequal caudal lobes are still quite marked in a specimen of *friderici* 152 mm. and another 250 mm. from Tumatumari, as well as in the specimens recorded under that species from Kangaruma, Rockstone, and Crab Falls.

In a specimen 215 mm. long from Tumatumari the caudal lobes are equal, and there is but one spot from the thirteenth to the fifteenth scale of the lateral line. In the specimens from about Wismar the lateral band is not seen, even in small specimens, but the caudal lobes are unequal.

160. **Leporinus maculatus** Müller and Troschel. (Plate XLIII, fig. 2.)

"Wacucu" of the Indians about the Kaieteur.

Leporinus maculatus Müller and Troschel, Horæ Ichth., I, 1845, 11 (Guiana); in Schomburgk, Reisen, III, 1848, 634 (Rupununi; Awaricuru).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 427.

Leporinus megalepis Günther, Ann. and Mag. Nat. Hist., (3), XII, 1863, 443 (Essequibo); Catalogue, V, 1864, 307, *part* (Essequibo; River Cupai; Bahia; Rio Janeiro); Proc. Zool. Soc. London, 1868, 244 (Xeberos).—Cope, Proc. Acad. Nat. Sci. Phila., 1871, 259 (Ambyiacu).—Steindachner, "Fisch-fauna d. Magdalenen-Stromes," 1878, 38, note.—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 51.—Vaillant, Bull. Mus. d'Hist. Nat., V, 1899, 155 (Carnot).—Eigenmann and Ogle, Proc. U. S. Nat. Mus., XXXIII, 1907, 7 (Rio das Velhas).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 426.

Leporinus marcgravii Lütken, Overs. Dan. Vidensk. Selsk. Forh., 1874, 130 (Rio das Velhas and tributaries); Dan. Vidensk. Selsk. Skr., (5), XII, 1875, 202, pl. 4, fig. 9; and p. xii (Rio das Velhas).

Ten specimens, 99–146 mm. Tukeit. (C. M. Cat. No. 1833*a–c*; I. U. Cat. No. 12123.)

Twelve specimens, 58–73 mm. Amatuk. (C. M. Cat. No. 1834*a–c*; I. U. Cat. No. 12124.)

Seven specimens, 90–129 mm. Creek below Potaro Landing. (C. M. Cat. No. 1835*a–b*; I. U. Cat. No. 12125.)

Three specimens, 90–125 mm. Tumatumari. (C. M. Cat. No. 1836*a*; I. U. Cat. No. 12126.)

Three specimens, 73–110 mm. Crab Falls. (C. M. Cat. No. 1837*a*; I. U. Cat. No. 12127.)

Four specimens, 89–106 mm. Bartica. (C. M. Cat. No. 1838*a–b*; I. U. Cat. No. 12128.)

I have examined the types of *maculatus* in the Berlin Museum. They are in a bad state of preservation, but undoubtedly belong to this species or the next. Inasmuch as they are from the Essequibo basin, they more probably belong to this species.

Head 4.5–4.6; depth 3–3.6; D. 12; A. 10; scales 5–32 or 34–3.5; eyes 1.3 in snout, 3.5 in head, 1.5 in interorbital.

Elongate, the width half as great as the depth; a distinct depression in the profile over the eye; snout bluntly conical, projecting beyond the small mouth, which is strictly inferior; three teeth on each side of each jaw.

Origin of dorsal about equidistant from snout and end of adipose; highest dorsal ray a little more than 4 in the length; upper caudal lobe considerably longer than the lower, about 3 in the length; anal emarginate, the highest ray scarcely, if at all, reaching beyond the tip of the last, sometimes not reaching it; anal not reaching caudal; ventrals reaching about half-way to middle of anal, pectorals half-way to last third or fourth of the ventrals.

A large oval black spot on the middle of the sides below the posterior part of the dorsal, a smaller less intense spot half-way between it and the caudal, and a still smaller one at the base of the caudal; a dark streak upward and forward from the eye, meeting its fellow on the snout; a dark band connecting the eyes; about nine short dark bands across the back; a dark spot on the lower part of the opercle, a smaller one between it and the orbit, in contact with the latter, another on the upper part of the gill-opening; a row of three spots on the sides, in a line continuous with the third dorsal bar in front of the dorsal; a similar row of larger spots continuous with the second bar in front of the dorsal; a spot below the middle of the large median spot, another below the space between the two lateral spots; sometimes the lower ends of some of the dorsal bands are separated as spots above the line of the median lateral spots; a spot at base of origin of anal; another above the end of the anal; caudal peduncle with a median dark spot and other dark shades or spots; posterior part of anal dark. The position and shape of the spots varies in the different individuals.

161. **Leporinus granti** sp. nov. (Plate XLIII, fig. 3.)

Type, 144 mm. Maripieru Creek. (Carnegie Museum Catalog of Fishes No. 1851.)

Cotypes, eight specimens, 108–185 mm. Maripieru Creek. (C. M. Cat. No. 1839*a*; I. U. Cat. No. 12129.)

These specimens differ from *L. megalepis* in the shape of the mouth and in the shape of the spots.

Mouth terminal; lateral spots more elongate, the row from near the upper angle of the gill-opening tending to form a continuous band with the lowermost spots of the sides; four teeth on the side of each jaw; lips much thicker than in *L. megalepis;* otherwise as in that species.

This species is named for Mr. William Grant, my most efficient Indian guide on the Potaro, who later made additional collections, which among other new species contained this.

162. **Leporinus alternus** sp. nov.

"Porchina" of the Wacusi Indians.

Type, 200 mm. Tukeit. (Carnegie Museum Catalog of Fishes No. 1827.)

Cotype, one specimen, 158 mm. Tumatumari. (C. M. Cat. No. 1826.)

Cotype, one specimen, 132 mm. Tukeit. (I. U. Cat. No. 12117.)

Cotypes, twelve specimens, 52–137 mm. Bartica. (C. M. Cat. No. 1828*a–c*; I. U. Cat. No. 12118.)

Head 4–4.2; depth 4; D. 12; A. 10 or 11; scales 5–38 or 39–4 or 5; eye 1.5–1.75 in snout, 3.5–3.75 in head, 1.75 in interorbital.

Elongate, subterete, the width 1.5 in the depth; preventral area rounded; head subconical, the mouth subterminal; four graduated, obliquely-pointed teeth in each jaw.

Dorsal rounded, its highest ray about 5 in the length, its origin nearer to tip of adipose than to snout; caudal deeply forked, the upper lobe 3.5 in the length; anal obliquely truncate, the lobe reaching caudal in the type, sometimes shorter; ventrals reaching half-way to anal or shorter, pectorals not half-way to middle of ventrals.

Seven cross-bands, the ones over pectorals, below dorsal, in front of anal, and at base of caudal, broad and heavy, the others much narrower.

163. **Leporinus fasciatus** (Bloch).

Salmo fasciatus Bloch, Ausl. Fische, 1795, pl. 379.

Leporinus fasciatus Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 34 (Surinam).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 634

(Pirara).—Kner, "Familie der Characinen," i, 1859, 35 (Irisanga).—Günther, Catalogue, V, 1864, 308 (Essequibo; River Cupai).—Peters, MB. Akad. Wiss. Berlin, 1877, 472 (Calabozo).—Steindachner, "Flussfische Südamerika's," i. 1879, 7 (Orinoco near Ciudad Bolivar).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 51.—Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 328 (Rio Parahyba).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 427.

Leporinus novemfasciatus Agassiz, Selecta Gen. et Spec. Pisc. Bras., 1829, 65, pl. 37.

Eighteen specimens, 74 to about 335 mm. Crab Falls. (C. M. Cat. No 1847*a–e*; I. U. Cat. No. 12137.)

Three specimens, 74–140 mm. Rockstone Stelling. (C. M. Cat. No. 1848; I. U. Cat. No. 12138.)

One specimen, 219 mm. Tumatumari, in the cataract. (C. M. Cat. No. 1849.)

Forty specimens, 68–315 mm. Bartica. (C. M. Cat. No. 1850*a–i*; I. U. Cat. No. 12139.)

One specimen, 52 mm. Konawaruk. (C. M. Cat. No. 2209.)

Head 4.25; depth 3.75; D. 12; A. 10; scales 6 or 7–41–6; eye 2 in snout, 4.5 in head, 2.5 in interorbital in the largest specimen; 1.25 in snout, 3 in head, 1.25 in interorbital in the smallest.

Elongate, the width a little more than half the height. Profile gently arched, with a scarcely perceptible change in the curve over the eye. Preventral area broad, rounded; snout conical, the mouth terminal; four teeth in each side of each jaw.

Dorsal obliquely rounded, the highest ray 4.5–5 in the length; caudal broad, the upper lobe 3.3–3.5 in the length. Anal very obliquely truncate or falcate, the anterior lobe extending beyond the origin of the caudal; ventrals reaching half-way to middle of anal in adult; pectorals half-way to middle of ventrals or beyond.

Young with the snout, a band through and over the eye, and another across the opercle and nape, black; five black bands encircling the body, one in front of the dorsal, one below and behind the dorsal, one in front and one behind the anal, and one at the end of the caudal peduncle. The first two split into two bands when a length of 75 mm. is reached, the next two begin to split at a length of 200 mm., the components moving apart; in the adult there are ten obscure bars about equally spaced, beginning with the one across the opercle. Upper fins and posterior part of anal dark blue.

In life the lower surface of the head is mottled with orange, and the lower sides and belly tinged with the same. Pectoral rays pink, yellow at the base; ventral rays maroon, yellow at base; anal rays bright orange, the membrane olive at base; caudal and adipose blackish blue, dorsal and upper sides similar, but a little lighter.

Subfamily Crenuchinæ.

Crenuchus Günther.

Crenuchus Günther, Ann. and Mag. Nat. Hist., (3), XII, 1863, 448.

Type, *Crenuchus spilurus* Günther.

Distinguished from all other American characins by its numerous, tricuspid teeth, in a single series in each jaw, by the long dorsal fin, and by the presence of an adipose fin. A broad depression between the eyes, but no frontal fontanel; parietal fontanel large, ovate; gill-membrane free; lateral line incomplete.

164. Crenuchus spilurus Günther.

Crenuchus spilurus Günther, Ann. and Mag. Nat. Hist., (3), XII, 1863, 448 (Essequibo); Catalogue, V, 1864, 365.—Steindachner, "Ichthyologische Beiträge," v, 1876, 83 (Tabatinga, Hyavary).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 59.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 430.

Five specimens, 43–56 mm. Georgetown trenches. (C. M. Cat. No. 1867*a*; I. U. Cat. No. 12152.)

Three specimens, 40–45 mm. Kumaka. (C. M. Cat. No. 1868*a*; I. U. Cat. No. 12153.)

Two specimens, 27–30 mm. Christianburg Canal. (C. M. Cat. No. 1869*a*; I. U. Cat. No. 12154.)

One specimen, 43 mm. Mud-flats below Wismar. (C. M. Cat. No. 1870*a*.)

Two specimens, 35–43 mm. Essequibo, below Packeoo Falls. (C. M. Cat. No. 1871*a*; I. U.Cat. No. 12155.)

Two specimens, 35–39 mm. Maduni Creek. (C. M. Cat. No. 1872*a*; I. U. Cat. No. 12156.)

Two specimens, 40–43 mm. Aruka River. (C. M Cat. No. 1883*a*; I. U. Cat. No. 12157.)

Two specimens, about 35 mm. Rockstone. (C. M. Cat. No. 2211.)

Head 3–3.25; depth 3.2–3.5; D. 18; A. 11; scales 6–29 to 32–3, five to seven with pores; eye .75 in snout, 3.5 in head, a little more than interorbital.

Compressed, with the dorsal and ventral outlines about equally arched; mouth

large; maxillary-premaxillary line forming a continuous curve, equal to half the length of the head (without subopercle); each side of each jaw with about twelve to fifteen tricuspid teeth in a single series. No teeth on the maxillary; suborbitals leaving about half the cheek naked.

Origin of dorsal equidistant from snout and tip of adipose or upper caudal lobe, the rays nearly equal in height in the female, the eighth to the twelfth of the male prolonged, reaching the caudal; anal rounded in the female, lanceolate in the male, the middle rays reaching beyond basal fifth of the caudal; ventrals reaching more than half-way to end of anal; pectorals half-way to middle of ventrals.

Sides uniformly dotted; a large spot a little below the middle at the end of the caudal peduncle; last rays and sometimes base of the dorsal and last rays of the anal hyaline, the rest of these fins uniformly dark with irregular bars or spots; corresponding parts of dorsal and anal in male with conspicuous semi-hyaline oval spots surrounded by much darker.

Pœcilocharax Eigenmann.

Pœcilocharax Eigenmann, Ann. Carnegie Mus., VI, 1909, 34.

Type, the single species.

165. Pœcilocharax bovallii Eigenmann. (Plate XLIV, figs. 1, 2.)

"Guabia"; "Wabéak."

Pœcilocharax bovallii Eigenmann, Ann. Carnegie Museum, VI, 1909, 34.

Types, male, 43 mm.; female, 40 mm. Creek at Savannah Landing. (Carnegie Museum Catalog of Fishes No. 1136*a–b*.)

Cotypes, over two hundred and twenty specimens. Creek at Savannah Landing. (C. M. Cat. No. 1137*a–z*; I. U. Cat. No. 11686.)

Cotypes, three specimens, 34–45 mm. Holmia. (C. M. Cat. No. 1138*a*; I. U. Cat. No. 11671.)

Cotype, one specimen, 38 mm. Two hours below Holmia. (C. M. Cat. No. 11390.)

Cotypes, sixty-three specimens, 22–47 mm. Creek at Tukeit. (C. M. Cat No. 1040*a–z*; I. U. Cat. No. 11672.)

Head 3–3.5; depth 3.2–3.3; D. 16; A. 11; scales 27–30, nine between dorsal and ventral, six with pores; eye equal to the snout, 3.5–4 in the head; interorbital almost equal to the eye.

Compressed, ventral profile gently and evenly arched. Dorsal outline rather steep to near the dorsal fin. Preventral and predorsal areas narrowly rounded, scaled.

Occipital process short, the fontanel large, oval, separated from the small frontal fontanel by a convex bridge on a level with the rest of the skull; suborbitals narrow, leaving most of the cheek naked. Mouth small, maxillary-premaxillary border 2.8 in the head; maxillary not quite equal to the eye. Teeth all long, tricuspid, in a single series, about eleven in the premaxillary, about five in the maxillary.

Gill-rakers 7 + 9, about equal to the pupil.

Origin of dorsal nearer to snout than to caudal, its rays of nearly uniform height, none prolonged. Anal considerably shorter than the dorsal, its *middle* rays highest, reaching in the male to middle of caudal; origin of anal under one of the last four dorsal rays; origin of ventrals and dorsal equidistant from snout; tips of ventrals reaching to the anal in the male, the ventrals slightly shorter in the female. Pectorals not quite reaching ventrals.

Scales cycloid, regularly imbricate, no interpolated scales. No scales on the anal, those along the base forming a sheath. Caudal naked. A very minute axillary scale.

Back dusky, margined by a darker stripe from above eye to upper caudal lobe. A light band from upper part of eye, becoming widest under the middle to end of dorsal in the male, widest on caudal peduncle, contracted on caudal fin in the female. A dark band from eye to upper part of gill-opening, thence descending to meet its fellow on the lower surface and edge of caudal peduncle, thence curved up on the caudal to tips of its middle rays; this band more intense, jagged, and more strongly decurved in the male than in the female. Sides of caudal peduncle with a rusty spot on each scale (female); dorsal in both sexes nearly uniform, darkest in the male. Upper margin of caudal geranium-red, most intense in the male, below which is a continuation of the upper dark band of the sides, fading out toward tip of upper lobe and with oval hyaline spots; a wedge-shaped area at middle of caudal and all but the base of some of the rays of the lower lobe hyaline. Tip of anal in male scarlet, below which is a broad dark band, base and last rays hyaline. Last rays of anal (female) hyaline, otherwise dark with conspicuous round or oval hyaline spots. Ventrals slightly dusky. Pectorals hyaline.

Subfamily Aphyocharacinæ.

Odontostilbe Cope.

Odontostilbe Cope, Proc. Am. Philos. Soc., XI, 1870, 566.

Type, *Odontostilbe fugitiva* Cope.

Minute fishes, with multicuspid incisors in a single series in each jaw, and a complete lateral line.

166. **Odontostilbe melandetus** sp. nov. (Plate XLIV, fig. 3.)

Type, 27 mm. Locality? (Carnegie Museum Catalog of Fishes No. 1878.)

Cotypes, three specimens, about 27–35 mm. Locality? (I. U. Cat. No. 12160.)

Readily distinguished by the black margin of the caudal peduncle.

Head 3.75; depth 3.6; D. 10; A. 21; scales 4–34 or 35–3. Eye 2.5–2.7 in the head; interorbital but little narrower than the eye.

Minute, compressed, head bluntish, the mouth terminal; a median series of ten scales in front of the dorsal. Maxillary very slender, reaching to below the eye; maxillary-premaxillary border as long as the eye; ten to fourteen teeth on the premaxillary, four to seven on the maxillary.

Scales very regularly imbricate, with concentric, but without longitudinal, striæ; lateral line complete, scarcely decurved; anal naked; base of caudal with a few scales.

Fins all well-developed, the anal deeply emarginate; pectorals not quite reaching ventrals, ventrals not to anal.

No chromatophores on the sides; scales of the back with marginal series of chromatophores; a series of black specks along the base of the anal, the caudal peduncle margined with black.

Aphyocharax[35] Günther.

Aphyocharax Günther, Proc. Zool. Soc. London, 1868, 254.

Type, *Aphyocharax pusillus* Günther.

Minute, slender fishes, with a single series of tricuspid teeth in the premaxillary, and a few teeth in the maxillary. Lateral line incomplete; gill-membranes free from the isthmus; a frontal and a parietal fontanel.

Key to the Guiana Species of Aphyocharax.

a. Dorsal with a black spot, humeral spot very faint, no caudal spot. A. 25; scales 5–7+25–2. . . **melanotus.**

aa. Dorsal without a black spot; anal plain; about fourteen scales in front of the dorsal; lateral line 34–37; A. 17. . . . . **erythrurus.**

167. **Aphyocharax melanotus** sp. nov.

Type unique, about 43 mm. Rockstone sand-bank. (Carnegie Museum Catalog of Fishes No. 1877.)

This is the only Guiana species of the genus with a black dorsal spot.

Head 4; depth 3.8; D. 10; A. 25; scales 5–6 + 27–2; eye much longer than snout, 2.75 in head; interorbital 3.75 in the head.

[35] *ἀφύη*, a small fish; *charax*, a genus of characins.

Compressed, preventral and predorsal areas rounded, the latter with a median series of ten scales.

Mouth large, the antero-posterior extent of the premaxillary very short, the maxillary with a curved anterior margin, its length about equal to that of the eye; about twelve teeth in each premaxillary; maxillary with about four similar teeth; about twenty teeth on each side of the lower jaw.

Scales cycloid, regularly imbricate, six scales with pores; caudal naked.

Ventrals just reaching anal; pectorals not reaching the ventrals.

Very few color-cells on the sides; scales of the back margined with dusky; upper part of the first few dorsal rays black.

Three small specimens (C. M. Cat. No. 1891; I. U. Cat. No. 12163) probably belong to this species.

168. **Aphyocharax erythrurus** sp. nov. (Plate XLIV, fig. 4.)

Type, 57 mm. Rockstone sand-bank. (Carnegie Museum Catalog of Fishes No. 1879.)

Cotypes, thirty-seven specimens, 28–58 mm. Rockstone sand-bank. (C. M. Cat. No. 1880*a–e*; I. U. Cat. No. 12161.)

Cotype, one specimen, 29 mm. to base of caudal. Maripieru Creek. (C. M. Cat. No. 1881*a*.)

Cotype, one specimen, 35 mm. Crab Falls. (C. M. Cat. No. 2494.)

Head about 4; depth 3.66–4; D. 10 or 11; A. 17; scales 5–34 to 37–3[36]; nine to eleven scales with pores; eye in adult a little longer than snout, 3.5 in the head; interorbital 3 in the head.

Elongate, preventral area with a median series of about thirteen scales; predorsal area with a median series of fourteen scales, the series irregular anteriorly; head somewhat blunt, the mouth terminal, oblique; maxillary-premaxillary border forming a continuous curve, its length 2.5 in the length of the head; six teeth in each premaxillary; about thirteen in each dentary, and about twelve to fourteen along the greater part of the maxillary.

Scales regularly imbricate, each scale of half-grown specimens with a median fifth free from striæ, above and below this with numerous parallel horizontal lines; anal and caudal naked.

Dorsal behind the ventrals; caudal deeply forked; anal emarginate; ventrals not reaching anal; pectorals not emarginate; pectorals not to ventrals.

Straw-colored; a diffuse humeral spot; caudal brick-red in life.

[36] And a few small ones on the caudal.

APHYODITE[37] gen. nov.

Type, the only species, *A. grammica*.

This is an *Aphyocharax* with a scaled caudal.

169. **Aphyodite grammica** sp. nov. (Plate XLIV, fig. 5.)

Type, about 32 mm. Konawaruk. (Carnegie Museum Catalog of Fishes No. 1882.)

Cotypes, two specimens, 30–32 mm. Konawaruk. (I. U. Cat. No. 12162.)

Head 4.5; depth 3.33; D. 11; A. 22; scales 4–7 + 23–3. Eye twice as long as the snout, 2.5 in the head; interorbital a little less than the eye.

Compressed, slender. Head short, compressed, the snout small, oblique; the maxillary not reaching to below the eye; cheeks small, entirely covered by the suborbital; maxillary margin convex, with three scarcely perceptible teeth; each premaxillary with about ten teeth.

Scales regularly imbricate, caudal lobes scaled to near their tips.

Adipose fin well-developed; anal emarginate; ventrals not reaching anal, pectorals not to ventrals.

Scales of the back margined with dark; a black median line; black at base of ventrals and base of anal.

Subfamily IGUANODECTINÆ.

IGUANODECTES Cope.

Iguanodectes COPE, Proc. Acad. Nat. Sci. Phila., 1871, 260, pl. 8, fig. 1.

Type, *Iguanodectes tenuis* Cope.

Range: Guianas and Amazons.

Gill-membranes united, free from the isthmus; upper jaw with two series of pluricuspid incisors, the outer series consisting of a single tooth in each side. Slender; anal long; lateral line complete.

One species known.

170. **Iguanodectes tenuis** Cope.

Iguanodectes tenuis COPE, Proc. Acad. Nat. Sci. Phila., 1871, 260, pl. 8, fig. 1 (Ambyiacu).—EIGENMANN and EIGENMANN, Proc. U. S. Nat. Mus., XVI, 1891, 54.—EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 430.

One specimen, 54 mm. Wismar. (C. M. Cat. No. 1884.)

Fifteen specimens, 35–92 mm. Rockstone sand-bank. (C. M. Cat. No. 1885*a–d*; I. U. Cat. No. 12164.)

[37] ἀφύη, a small fish; ὄϊτε, born of.

Four specimens, 68–75 mm. Gluck Island. (C. M. Cat. No. 1886*a*; I. U. Cat. No. 12165.)

Ten specimens, 57–73 mm. Konawaruk. (C. M. Cat. No. 1887*a–b*; I. U. Cat. No. 12166.)

Six specimens, 53–74 mm. Warraputa. (C. M. Cat. No. 1888*a–b*; I. U. Cat. No. 12167.)

One specimen, 79 mm. Tumatumari. (C. M. Cat. No. 1889.)

Seventeen specimens, 65–85 mm. Rupununi. (C. M. Cat. No. 1890*a–d*; I. U. Cat. No. 12168.)

Head 4.3–5; depth 4.5; D. 10; A. 35 or 36; scales 8–65 or 66–5. Eye 1 in snout, 3 in head, 1 in interorbital in the largest; .75, 2.5, and 1 respectively in the smallest.

Slender, compressed, resembling *Creatochanes;* ventral arch slightly greater than the dorsal; preventral area rounded, predorsal area similar, neither with a distinct median series of scales.

Occipital crest short, about 9 in the distance from its base to the dorsal; fontanels broad, the parietal fontanel twice as long as the frontal, which extends to above the middle of the eye; interorbital convex; jaws equal, the mouth terminal, short, the maxillary meeting the premaxillary at an angle; cheeks narrow, entirely covered by the suborbitals. Premaxillary with five pluricuspid teeth in the inner series, a single much narrower tooth in front of the space between the first and second tooth; maxillary with one or two teeth similar to those of the inner teeth of the premaxillary; seven similar graduate teeth on each side of the lower jaw.

Gill-rakers short, slender, 5 + 10.

Scales thin, adherent, regularly imbricate, with few radiating striæ. Anal and caudal naked; lateral line slightly decurved; axillary scale well-developed.

Origin of dorsal equidistant from base of middle caudal rays and middle or anterior margin of eye, its height less than one-fifth of the length; adipose fin small; caudal forked, its lobes about 5 in the length; anal very long, emarginate in front, its base about 3 in the length; ventrals scarcely reaching anal. Pectorals broad, placed low, their bases nearly horizontal, their tips not quite reaching the ventrals.

Iridescent, a rusty spot on upper part of caudal peduncle; upper caudal lobe dark, darkest towards the base of the middle rays; a silvery lateral band; a black dorsal line.

Piabucus Cuvier.

"Les Piabuques" Cuvier, Règne Animal, II, 1817, 166 (*argentinus*).

Piabucus Oken, Isis, 1817, 1183.

Type, *Salmo argentinus* Linnæus.

With the character of *Iguanodectes*, but with the preventral area sharply trenchant.

Three species, of which one was taken in Guiana.

171. Piabucus dentatus Kœlreuter.

"Piabuca" Marcgrave, Hist. Rer. Nat. Bras., IV, 1648, 170.

Trutta dentata Kœlreuter, Nov. Comm. Petropoli, VIII, 1761, 413, pl. 14, fig. 4.

Piabucus dentatus Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 440.

Salmo argentinus Linnæus, Syst. Nat., ed. 12, 1766, 511.—Bloch, Ausl. Fische, 1785, pl. 382, fig. 1.—Bloch and Schneider, Syst. Ichth., 1801, 403.

Characinus argentinus Lacépède, Hist. Nat. Poiss., V, 1790, 272.

Piabuca argentina Cuvier, Règne Animal, II, 1817, 310 (*fide* Müller and Troschel).—Müller and Troschel, Hor. Ichth., I, 1845, 9, pl. 1, fig. 1; in Schomburgk, Reisen, III, 1848, 633 (Lake Amucu and Savannah swamps).—Cuvier and Valenciennes, Hist. Nat. Poiss., XVII, 1848, 108.—Günther, Catalogue, V, 1864, 344.—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 57.—Steindachner, "Ichthyologische Beiträge," XV, 1891, 22 (Iquitos).

Eight specimens, 102–138 mm. Koreabo Rubber Plantation. (C. M. Cat. No. 1891*a–b*; I. U. Cat. No. 12169.)

Two specimens, 149–155 mm. Wismar. (C. M. Cat. No. 1892; I. U. Cat. No. 12170.)

Head 5.66–6.3; depth 3.6–3.66; D. 10 or 11; A. 43–45; scales 11–84–7. Eye 1 in snout, 3.25 in head, 1.5 in interorbital.

Elongate, compressed; profile depressed over the nape and eyes; ventral profile exaggerated in front of the ventrals; predorsal area narrowly rounded, preventral area compressed to an edge, the region between the bases of the pectorals stiff, the region just in front of the ventrals with a flexible ridge of scales.

Occipital crest narrow, reaching about one-seventh of the distance from its base to the dorsal; parietal fontanel broad, more than twice as long as the frontal, which is nearly equilaterally triangular; mouth small, terminal, the jaws subequal, premaxillary meeting the minute maxillary at an angle. Six or seven pluricuspid teeth in the inner row of the premaxillary, the outer row composed of a single

tooth on each side of each jaw, similar to, but narrower than, those of the inner series; two similar teeth on the maxillary and seven similar ones on each side of the lower jaw; cheeks narrow, entirely covered by the suborbitals.

Scales thin, cycloid, deeply imbricate, with few (or more frequently no) radial striæ; caudal and anal naked; lateral line complete, decurrent; dorsal short, its length less than half its height, which is 6.75 in the length; lower caudal lobe the longer, 4.5 in the length; origin of anal under origin of dorsal or a little farther forward; ventrals small, not reaching anal, in contact along their inner margin when closed; pectorals large, directed downward and backward when closed, the tips projecting beyond the ventral profile, not reaching the ventrals; when opened the margins of the pectorals are in one plane.

Iridescent, the middle caudal rays dusky, otherwise without marking.

Subfamily Agoniatinæ.

Agoniates Müller and Troschel.

Agoniates Müller and Troschel, Hor. Ichth., I, 1845, 33 (*halecinus*).

Type, *Agoniates halecinus* Müller and Troschel.

Breast trenchant, not expanded; maxillary and mandible with a single series, premaxillary with two series of teeth, those of the inner series of the premaxillary tricuspid; a large canine on the mandible on each side anteriorly, received in a groove on the palate; a few minute tricuspid teeth between the anterior canine teeth, a pair of conical teeth within the outer series in front; seven or eight conical teeth on the side of the lower jaw behind the fangs, the third largest; cheeks entirely covered.

A genus of one species.

172. Agoniates halecinus Müller and Troschel.

Agoniates halecinus Müller and Troschel, Horæ Ichth., I, 1845, 33, pl. 7, fig. 2 (Guiana); in Schomburgk, Reisen, III, 1848, 636 (Cuyuni).—Cuvier and Valenciennes, Hist. Nat. Poiss., 1848, 347.—Günther, Catalogue, V, 1864, 344.—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 57.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 440.

Head 4.66 in the length; depth somewhat less than the length of the head; A. 30; lateral line 39, silvery.

This species, which greatly resembles *Hydrolycus scomberoides*, is known from the type only, about 100 mm. long, in the Berlin Museum.

Subfamily Tetragonopterinæ.

As a full account of the Tetragonopterinæ is about to be published in the *Memoirs of the Museum of Comparative Zoology*, the account of these species given in this work is, therefore, made brief.

Tetragonopterus Cuvier.

"Tetragonoptrus" Artedi, in Seba, Locupl. Rer. Nat. Thes. Acc. Descr., III, 1748, pl. 34, fig. 3.

Tetragonopterus Cuvier, Regne Animal, II, 1817, 166 (*argenteus*).

Type, *Tetragonopterus argenteus* Cuvier.

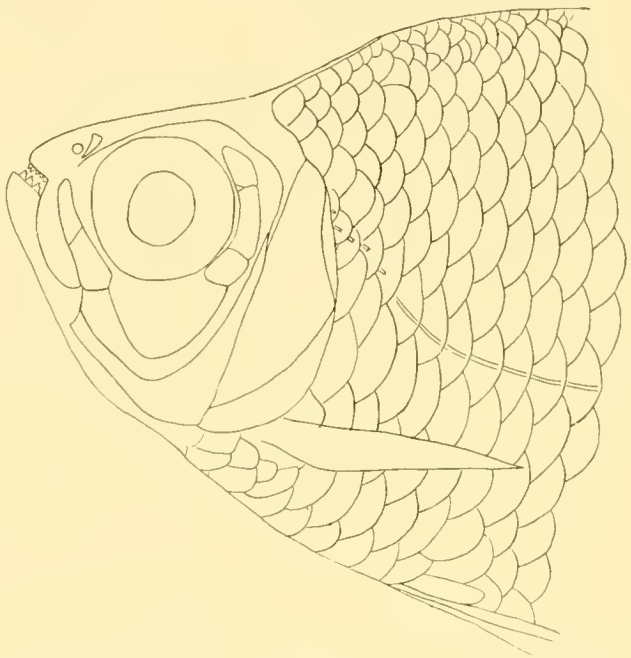

Fig. 37. *Tetragonopterus argenteus* Cuvier. No. 20718 Mus. Comp. Zool.

The depth at least half the length; humped at the occiput; concave over the eyes; premaxillary teeth in two rows, those of the outer series small, of nearly uniform size, the row more or less regular, those of the inner series larger, graduated, multicuspid, the cusps of each tooth arranged in a curve, the middle cusp much the longest; several large, graduated, pointed teeth in the front of the lower jaw, and abruptly minute teeth on the sides; maxillary with or without teeth on its upper anterior edge; preventral area flat, bounded by sharp angles; a median series of scales on the breast.

KEY TO THE GUIANA SPECIES OF TETRAGONOPTERUS.

a. A. 36; scales in front of dorsal crowded, about fifteen in the median line; occipital process bordered by seven scales on each side; caudal scaled on its basal part only; scales 8–33–4; head 3.33; depth 1.70; eye 2.3 in head, .8 in interorbital; pectoral extending three scales beyond origin of ventrals; a black bar across base of caudal; two oblique bars across anterior part of sides..... **argenteus.**

aa. A. 31–33; scales in front of dorsal normal, eight or nine in the median line; occipital process bordered by four scales; caudal more densely scaled; scales 7 or 8–33–3.5; head 3.66; depth 1.7–2; eye 2.33; interorbital 2.5 in the head; pectoral extending to the ventrals or one scale beyond them; a black spot or bar at the base of the caudal; two faint oblique bars across anterior part of the sides..... **chalceus.**

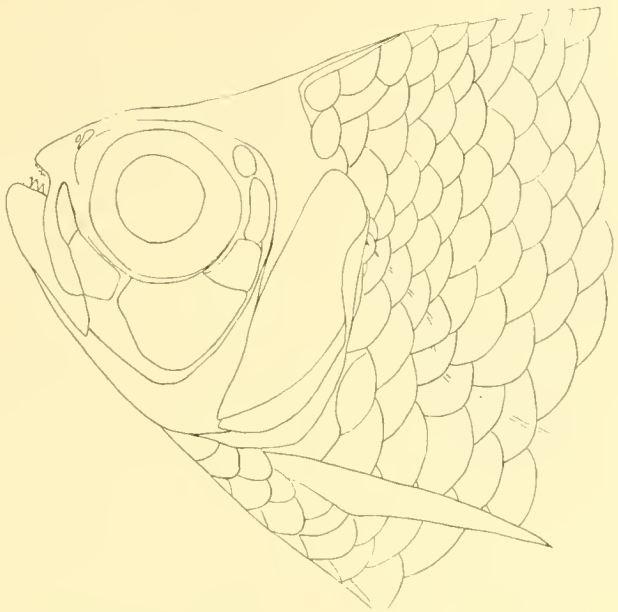

FIG. 38. *Tetragonopterus chalceus* Agassiz. No. 20718 Mus. Comp. Zool.

173. Tetragonopterus argenteus Cuvier.

Tetragonopterus argenteus CUVIER, Mem. Mus. d'Hist. Nat., IV, 1818, 455.—MÜLLER and TROSCHEL, in Schomburgk, Reisen, III, 1848, 634 (Amucu).—KNER, "Familie der Characinen," i, 1859, 38 (Cajaba; Guiana).—STEINDACHNER, "Flussfische Südamerika's," i, 1879, 7 (Orinoco near Ciudad Bolivar).—EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 438.

Tetragonopterus rufipes VALENCIENNES, in d'Orbigny, Voy. Am. Mer., V, ii, 1847, pl. 2, fig. 2.

Tetragonopterus sawa CASTELNAU, Anim. Am. Sud, Poiss., 1855, 65, pl. 33, fig. 1 (Rio Coxas).

Tetragonopterus chalceus (not of Agassiz) EIGENMANN and KENNEDY, Proc. Acad. Nat. Sci. Phila., 1903, 523.

For the full bibliography of this species, found from the Orinoco to Buenos Aires and from Pará to Iquitos, see the paper by the writer in the *Memoirs of the Museum of Comparative Zoology.*

One specimen, 67 mm. Tumatumari. (C. M. Cat. No. 1489.)

174. Tetragonopterus chalceus Agassiz.

"Coregonus amboinensis" Artedi, Ichthyologia, 1738, Species 44.

Tetragonopterus chalceus Agassiz, Selecta Gen. et Spec. Pisc. Bras., 1829, 70, pl. 33, fig. 1.—Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 140 (no specimens).—Kner, "Familie der Characinen," i, 1859, 38 (Rio Negro; Surinam).—Günther, Catalogue, V, 1864, 320 (British Guiana; Essequibo).—Vaillant, Bull. Mus. d'Hist. Nat., V, 1899, 154 (Carsevenne).—Pellegrin, Bull. Mus. d'Hist. Nat., V, 1899, 157 (Apuré).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 438.

? *Tetragonopterus artedii* Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 128 (Surinam).

Tetragonopterus schomburgkii Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 137 (Essequibo).

Tetragonopterus ortoni Gill, Proc. Acad. Nat. Sci. Phila., 1870, 92.

Four specimens, 58–68 mm. Wismar. (C. M. Cat. No. 1377*a*; I. U. Cat. No. 11852.)

Six specimens, 68–71 mm. Bartica. (C. M. Cat. No. 1378*a–b*; I U. Cat. No. 11853.)

Fifteen specimens, 47–76 mm. Tumatumari. (C. M. Cat. No. 1379*a–c*; I. U. Cat. No. 11854.)

Eighteen specimens, 50–91 mm. Crab Falls. (C. M. Cat. No. 1380*a–f*; I. U. Cat. No. 11855.)

Forty-eight specimens, 41–49 mm. Rockstone. (C. M. Cat. No. 1381*a–j*; I. U. Cat. No. 11856.)

Characters as given in the key and figure. For a full account see the *Memoirs of the Museum of Comparative Zoology.*

Mœnkhausia Eigenmann.

Mœnkhausia Eigenmann, Smiths. Misc. Coll., Quarterly Issue, XLV, 1903, 145.

Type, *Tetragonopterus xinguensis* Steindachner.

Two series of notched teeth in the premaxillary; maxillary with a few teeth; caudal scaled, its lobes equal, anal naked; lateral line complete,[38] little decurved; scales entire.

[38] Except sometimes in *M. cotinho.*

Only outlines of the characters of the species of this genus are given. A full account of all of them will appear in the *Memoirs of the Museum of Comparative Zoology*, 1911.

KEY TO THE GUIANA SPECIES OF MŒNKHAUSIA.

a. Depth 2–2.7; A. 23–30; occipital process one-third to one-fifth of the distance of its base from the dorsal.
b. A broad black band across the base of the caudal, bordered by yellow in front; A. 25 or 26; scales 5–30 or 31–4. ..... **oligolepis.**
bb. Caudal plain or with a small basal spot.
c. Depth less than 2 in the length; A. 34; scales 7.5–35–7. ..... **profunda.**
cc. Depth 2 or more in the length.
d. Eye 2.3 or more in the head; no caudal spots.
e. Striæ of scales diverging from the middle line of each scale in nearly opposite directions; depth 2 in the adult; A. 26–28; scales 5–33–4. ..... **grandisquamis.**
ee. Striæ of scales parallel or but slightly diverging.
f. A conspicuous humeral spot nearly equidistant from opercle and the vertical from the dorsal; iridescent silvery, the fins yellowish in life; A. 26–30; scales 7–33 or 34–5. **chrysargyrea.**
ff. Humeral spot much nearer opercle than dorsal; scales of the sides with a dark margin. A. 23 or 24; scales 5–30 to 34–3. ..... **browni.**
dd. Eye 2–2.2 in the head.
g. No caudal spot, a vertical humeral spot; A. 28–30; scales 5–35 or 36–4. ..... **megalops.**
gg. A median caudal spot, no humeral spot; A. 26; scales 5–34–3 or 4. ..... **shideleri.**
aa. Depth 2.75 or more in the length; three or four scales (rarely five in *cotinho*) between lateral line and ventrals.
h. Caudal lobes with a median black cross-band, the base canary yellow in life, the tips white. A. 25–28; scales 5 or 5.5–34 to 39–3 or 3.5. ..... **dichroura.**
hh. Caudal lobes without cross-band.
i. Upper caudal lobe black with a red or yellow spot at its base; a faint humeral spot; A. 22–27; scales 5–34–4. ..... **lepidura.**
ii. Caudal lobes alike.
j. A very conspicuous large black caudal spot, surrounded by rusty in life. A. 20 or 21; scales 5–32–3 to 5. ..... **cotinho.**
jj. Caudal plain.
k. Anal rays 23–24; vertical fins tinged with red; scales 5–34–3.5. ..... **colletti.**
kk. Anal rays 18–20; upper caudal lobe rose-colored or rusty; anal and dorsal with yellow; scales 5–32 to 34–3.5. ..... **copei.**

175. Mœnkhausia oligolepis (Günther). (Plate XLVI, fig. 3.)

Tetragonopterus tæniatus (not of Jenyns) MÜLLER and TROSCHEL, in Schomburgk, Reisen, III, 1848, 635 (trenches and swamps along the coast).

Tetragonopterus oligolepis GÜNTHER, Catalogue, V, 1864, 327 (British Guiana).—EIGENMANN and EIGENMANN, Proc. U. S. Nat. Mus., XIV, 1891, 53.—ULREY, Ann. N. Y. Acad. Sci., VIII, 1895, 282.—VAILLANT, Bull. Mus. d'Hist. Nat., V, 1899, 155 (Carnot).

Mœnkhausia oligolepis Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 437.

Tetragonopterus agassizii Steindachner, "Ichthyologische Beiträge," v, 1876, 41, pl. 8, fig. 2 (Tabatinga; Cudajas; Hyavary).

? *Astyanax atahualpianus* Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 436, fig. 36 (Pebas).

I have examined the specimen marked *Tetragonopterus tæniatus* in Berlin. It is without doubt *Mœnkhausia oligolepis*. I did not secure it along the coast, where Schomburgk said it was found.

Thirty specimens, 35–96 mm. Holmia. (C. M. Cat. No. 1361*a–j*; I. U. Cat. No. 11835.)

Eleven specimens, 39–118 mm. Aruataima Cataract. (C. M. Cat. No. 1362*a–c*; I. U. Cat. No. 11836.)

Eleven specimens, 33–53 mm. Potaro River two hours below Holmia. (C. M. Cat. No. 1363*a–c*; I. U. Cat. No. 11837.)

Seven specimens, 28–44 mm. Savannah Landing. (C. M. Cat. No. 1364*a–b*; I. U. Cat. No. 11838.)

Three specimens, 37–61 mm. Erukin. (C. M. Cat. No. 1365*a*; I. U. Cat. No. 11839.)

One specimen, 88 mm. Potaro Landing. (C. M. Cat. No. 1367*a*.)

Eight specimens, 40–47 mm. Tumatumari. (C. M. Cat. No. 1368*a–b*; I. U. Cat. No. 11840.)

One specimen, 78 mm. Maripicru. (C. M. Cat. No. 1369.)

Abundant in the Potaro both above and below the Kaieteur Falls.

Head 3.6–4; depth 2.25 on an average; D. 11; A. usually 25 or 26; scales 5–30 to 31–4; eye 2.5–3 in the head; interorbital wider than eye. A broad black band across the end of the caudal peduncle and base of caudal; distal part of all the caudal rays light; pink in life; a faint vertically oval humeral spot.

176. **Mœnkhausia profunda** sp. nov. (Plate XLVI, fig. 1.)

Type, 51 mm. Cloaca trenches, Issorora Rubber Plantation. (Carnegie Museum Catalog of Fishes No. 2207.)

Cotype, 51 mm. Same locality. (I. U. Cat. No. 12363.)

One of the most interesting catches of the expedition. The species differs from *Fowlerina orbicularis* solely in the generic character, *i. e.*, the absence of the predorsal spine. It is in all probability a derivative of *orbicularis* as *Fowlerina* was in all probability a derivative of the genus *Mœnkhausia*. Of the known species of *Mœnkhausia* it approaches closest to *chrysargyrea*.

Head 3.8: depth 1.75; D. 11; A. 34; scales 7.5–35–7; eye .4 in snout, 2.5 in head, 1 in interorbital.

Deep and much compressed. For the description read that of *Fowlerina orbicularis*.

Dorsal not reaching to adipose; anal but little emarginate, the highest ray reaching the seventeenth ray.

177. **Mœnkhausia grandisquamis** (Müller and Troschel). (Plate XLVII, fig. 2.)

Tetragonopterus grandisquamis Müller and Troschel, Horæ Ichth., I, 1845, 27, pl. 8, fig. 2 (Surinam).—Günther, Catalogue V, 1864, 328 (British Guiana).—Ulrey, Ann. N. Y. Acad. Sci., VIII, 1895, 281.

Mœnkhausia grandisquamis Eigenmann, Repts Princeton Univ. Exp. Patagonia. III, 1910, 437.

Fifty-one specimens, 45–79 mm. Bartica. (C. M. Cat. No. 1348*a–j*; I. U. Cat. No. 11857.)

Sixty-six specimens, 51–86 mm. Rockstone. (C. M. Cat. No. 1349*a–j*; I. U. Cat. No. 11858.)

Thirty-five specimens, 50–115 mm. Crab Falls. (C. M. Cat. No. 1350*a–j*; I. U. Cat. No. 11859.)

Eight specimens, 64–110 mm. Tumatumari. (C. M. Cat. No. 1351*a–c*; I. U. Cat. No. 11860.)

One specimen, 122 mm. Kangaruma. (C. M. Cat. No. 1352*a*.)

One specimen, 55 mm. Wismar. (C. M. Cat. No. 1353*a*.)

This species is also abundant in the Amazon basin.

Head 3.5–4; depth usually 2 in the adult; D. 10 or 11; A. usually 26–28: scales 5–35–4; eye 2.33–2.5 in head; interorbital equal to eye, or but a trifle larger.

A round humeral spot over the third to fifth scales of the lateral line, disappearing with age; no caudal spot in adult; sometimes a dusky area at end of caudal peduncle in young; a distinct silvery lateral band, the width of the free margin of a row of scales; fins all plain, mostly hyaline; sides silvery, highly iridescent.

178. **Mœnkhausia chrysargyrea** Günther.

Tetragonopterus chrysargyreus Günther, Catalogue, V, 1864, 328 (Essequibo).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 53.—Ulrey, Ann. N. Y. Acad. Sci., VIII, 1895, 281.

Mœnkhausia chrysargyrea Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 437 (Tabatinga; Teffé; Jutahy; José Fernandez).

Forty-three specimens, 51–61 mm. Rockstone. (C. M. Cat. No. 1370*a–j*; I. U. Cat. No. 11841.)

Seven specimens, 51–91 mm. Crab Falls. (C. M. Cat. No. 1371*a–b*; I. U. Cat. No. 11842.)

Fifteen specimens, 53–69 mm. Konawaruk. (C. M. Cat. No. 1372*a–e*; I. U. Cat. No. 11843.)

One specimen, 58 mm. Warraputa Cataract. (C. M. Cat. No. 1366*a*.)

Twenty-six specimens, 52–101 mm. Packeoo Falls. (C. M. Cat. No. 1373*a–e*; I. U. Cat. No. 11844.)

Ten specimens, 60–87 mm. Tumatumari. (C. M. Cat. No. 1374*a–c*; I. U. Cat. No. 11845.)

One specimen, 60 mm. Wismar. (C. M. Cat. No. 1375.)

Two specimens, 58–60 mm. Rupununi Pan. (C. M. Cat. No. 1376; I. U. Cat. No. 11846.)

Head 3.5–4; depth 2.4 in young, 2 in old; D. 11; A. 27–30; scales 7–33 to 34–5. Eye 2.5–2.75 in head; interorbital equal to eye.

Iridescent silvery. A deep-lying, well-defined, horizontally oval, circular, or rhomboidal, black spot over the space between the fifth to the eighth scale of the lateral line; no caudal spot.

179. **Mœnkhausia browni** Eigenmann. (Plate XLVII, fig. 3.)

"Conia."

Mœnkhausia browni Eigenmann, Ann. Carnegie Mus., VI, 1909, 13; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 438.

Type, 66 mm. Aruataima Falls, Potaro River. (Carnegie Museum Catalog of Fishes No. 1004.)

Cotypes, twenty-five specimens, 46–82 mm. Holmia, Potaro River. (C. M. Cat. No. 1005*a–e*; I. U. Cat. No. 11711.)

Cotypes, twelve specimens, 28–68 mm. Two hours below Holmia. (C. M. Cat. No. 1006*a–c*; I. U. Cat. No. 11712.)

Cotypes, sixty-nine specimens, 23–80 mm. Savannah Landing, above Kaieteur. (C. M. Cat. No. 1007*a–j*; I. U. Cat. No. 11713.)

Cotype, one specimen, 31 mm. Creek below Savannah Landing, above Kaieteur. (C. M. Cat. No. 1008.)

Cotypes, nine specimens, 30–62 mm. Tukeit, below Kaieteur. (C. M. Cat. No. 1009*a–b*; I. U. Cat. No. 11714.)

Cotypes, two specimens, 48–50 mm. Amatuk, Lower Potaro. (C. M. Cat. No. 1010; I. U. Cat. No. 11715.)

Cotype, one specimen, 65 mm. Tumatumari, Lower Potaro. (C. M. Cat. No. 1011.)

Very similar to *M. oligolepis*, but without trace of caudal spot and with the anal falcate.

Head 3.75–4; depth 2.3–2.6; D. 11; A. 23 or 24; scales 5–30 to 34–3; eye 2.4–2.5; interorbital 2.8–3.

No caudal spot; a large, horizontally oval, humeral spot continued below to the origin of the pectoral; a dark band from origin of dorsal obliquely downward and forward to the lateral line; a dark median lateral line; white below, dark along back; each scale of the side with a conspicuous dark crescent along its middle.

In life all fins but the adipose strongly tinged with red; middle of adipose yellow.

This species, abundant in the Potaro River above and below the Kaieteur, is dedicated to the memory of C. Barrington Brown, the discoverer of this most beautiful fall.

180. **Mœnkhausia megalops** Eigenmann.

Tetragonopterus grandisquamis (not of Müller and Troschel) Ulrey, Ann. N. Y. Acad. Sci., VIII, 1895, 281 (Itaituba).

Astyanax megalops Eigenmann, Proc. U. S. Nat. Mus., XXXIII, 1907, 29 (Itaituba, Brazil).

Mœnkhausia megalops Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 438.

One specimen, 57 mm. Rockstone. (C. M. Cat. No. 2488.)

Head 3.6–3.7; depth 2.5–2.66; D. 9–11; A. 28–30. Scales 5–35–4; eye 2–2.2 in head, twice as long as snout; interorbital 2.8–3 in head.

A vertical humeral spot above the space between the third and fifth scales of the lateral line, faint; no caudal spot; a silvery lateral line; some metallic reflections.

181. **Mœnkhausia shideleri** Eigenmann. (Plate XLVII, fig. 4.)

Mœnkhausia shideleri Eigenmann, Ann. Carnegie Mus., VI, 1909, 15; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 438.

Type, 65 mm. (Carnegie Museum Catalog of Fishes No. 1012.) Bartica.

Cotype, 73 mm. Bartica. (I. U. Cat. No. 11716.)

Cotype, 63 mm. Tumatumari.

This species has the largest eye of any in the genus.

Head 3.7–3.8; depth 2.5–2.7; D. 10; A. 26; scales 5–34–3 or 4; eye 2.1 in head; interorbital 2.4 or 2.5 in head.

No humeral spot; caudal with a small, diffuse, dark spot at the base of the middle rays. Scales of sides margined with dark, the marginal spots tending to form dark lines along the sides; pigment more profuse toward the back; a series of dark spots on the median series of scales of the back.

This species is named for Mr. S. E. Shideler, volunteer assistant on the Guiana Expedition.

182. Mœnkhausia dichroura (Kner).

Tetragonopterus dichrourus Kner, "Familie der Characinen," i, 1859, 41, pl. 9, fig. 21 (Rio Guaporé; Caiçara; Paraguay).—Günther, Catalogue, V, 1864, 324.—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 53.—Ulrey, Ann. N. Y. Acad. Sci., VIII, 1895, 279.—Perugia, Ann. Mus. Genova, (2a), X, 1891, 45 (Chaco Centrale).—Boulenger, Trans. Zool. Soc. London, XIV, 1896, 35 (San Luis and Descalvados).—Eigenmann and Kennedy, Proc. Acad. Nat. Sci. Phila., 1903, 52 (Asuncion).

Mœnkhausia dichrourus Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 438.—Eigenmann and Ward, Ann. Carn. Mus., IV, 1907, 138, Pl. XLI, fig. 1 (Corumbá, Porto Max; Asuncion).

Two specimens, 59–62 mm. Warraputa Cataract. (C. M. Cat. No. 1345*a*; I. U. Cat. No. 11861.)

Two specimens, 28–65 mm. Crab Falls. (C. M. Cat. No. 1346*a*.)

Twelve specimens, 58–63 mm. Konawaruk. (C. M. Cat. No. 1347*a–d*; I. U. Cat. No. 11862.)

Head about 4; depth usually 3; D. 11; A. 25–28; scales 5 or 5.5–34 to 39–3 or 3.5; eye 2.4–2.6; interorbital slightly less than eye.

The silvery lateral band is underlaid with a black band of the same size and shape. Base of caudal lobes in life bright yellow; middle caudal rays and a bar across the lobes black; tips of caudal lobes milk-white.

183. Mœnkhausia lepidura (Kner).

Tetragonopterus lepidurus Kner, "Familie der Characinen," i, 1859, 40, pl. 8, fig. 20 (Rio Guaporé).—Günther, Catalogue, V, 1864, 328.—Steindachner, "Flussfische Südamerika's," iv, 1882, 32 (Tabatinga; Cudajas; Obidos; Villa Bella).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 53.—Ulrey, Ann. N. Y. Acad. Sci., VIII, 1895, 278.—Vaillant, Bull. Mus. d'Hist. Nat., V, 1899, 155 (Carnot).

Mœnkhausia lepidurus Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 438.

Two hundred and three specimens, 54–75 mm. Bartica. (C. M. Cat. No. 1335*a–z*; I. U. Cat. No. 11825.)

Twelve specimens, 48–71 mm. Rockstone. (C. M. Cat. No. 1336*a–c*; I. U. Cat. No. 11826.)

Eight specimens, 42–56 mm. Gluck Island. (C. M. Cat. No. 1337*a–b*; I. U. Cat. No. 11827.)

Fifty-one specimens, 44–80 mm. Crab Falls. (C. M. Cat. No. 1338*a–j*; I. U. Cat. No. 11828.)

Twenty-two specimens, 45–58 mm. Konawaruk. (C. M. Cat. No. 1339*a–e*; I. U. Cat. No. 11829.)

Seven specimens, 45–82 mm. Warraputa. (C. M. Cat. No. 1340*a–b*; I. U. Cat. No. 11830.)

Three hundred and fifteen specimens, 42–95 mm. Tumatumari. (C. M. Cat. No. 1341*a–z*; I. U. Cat. No. 11831.)

Twenty specimens, 45–94 mm. Creek below Potaro Landing. (C. M. Cat. No. 1342*a–c*; I. U. Cat. No. 11832.)

Four specimens, 51–61 mm. Erukin. (C. M. Cat. No. 1343*a–b*; I. U. Cat. No. 11833.)

Four specimens, 62–108 mm. Malali. (C. M. Cat. No. 1344*a–b*; I. U. Cat. No. 11834.)

Head 3.75–4.4; depth 3–3.5; D. 11; A. 22–27; scales 5–34–4; eye 2.5–3, about equal to the interorbital.

Base of upper caudal lobe in life conspicuously yellow or orange or cherry; base of lower caudal lobe, adipose fin, dorsal rays, and anal lobe less intensely yellow or orange; upper caudal lobe beyond the basal spot black (of varying intensity); a small, horizontally oval, or round, humeral spot over the second and third scales of the lateral line.

184. **Mœnkhausia cotinho** Eigenmann.

Mœnkhausia cotinho Eigenmann, Bull. Mus. Comp. Zool., LII, 1908, 104; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 438.

Thirty-five specimens, 34–55 mm. Wismar. (C. M. Cat. No. 1312*a–j*; I. U. Cat. No. 11813.)

Thirty-three specimens, 42–60 mm. Malali. (C. M. Cat. No. 1313*a–j*; I. U. Cat. No. 11814.)

Twenty-two specimens, 52–62 mm. Tukeit. (C. M. Cat. No. 1314*a–b*; I. U. Cat. No. 11818.)

One specimen, 64 mm. Kangaruma. (C. M. Cat. No. 1315*a*.)

Six specimens,[39] 45–51 mm. Mud-flats below Wismar. (C. M. Cat. No. 1316*a–b*; I. U. Cat. No. 11815.)

Twenty-seven specimens,[40] 44–66 mm. Tumatumari. (C. M. Cat. No. 1317*a–e*; I. U. Cat. No. 11812.)

Seventeen specimens,[41] 43–59 mm. Crab Falls. (C. M. Cat. No. 1318*a–e*; I. U. Cat. No. 11819.)

Seven specimens,[42] 41–57 mm. Christianburg. (C. M. Cat. No. 1319*a–b*; I. U. Cat. No. 11816.)

Two specimens,[43] 35 and 57 mm. Rockstone. (C. M. Cat. No. 1320*a*; I. U. Cat. No. 11817.)

Head 3.7–3.8; depth 3+; D. 11; A. 20 or 21; scales 5–32–3.5; eye 2.75–3; interorbital slightly greater than eye.

Brassy, fins dusky. A very large and very conspicuous, vertically oval, black spot, bordered behind with rusty or milk-white, occupies all of the base of the caudal.

185. **Mœnkhausia colletti** (Steindachner).

Tetragonopterus collettii Steindachner, "Flussfische Südamerika's," iv, 1882, 33, pl. 7, fig. 3 (Obidos; Hyavary).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 53.—Ulrey, Ann. N. Y. Acad. Sci., VIII, 1895, 281.

Mœnkhausia collettii Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 438.

Nineteen specimens, 43–58 mm. Wismar. (C. M. Cat. No. 1325*a–e*; I. U. Cat. No. 11804.)

Five specimens, 34–39 mm. Malali. (C. M. Cat. No. 1326*a–b*; I. U. Cat. No. 11807.)

One hundred and twenty-six specimens, 40–61 mm. Rockstone. (C. M. Cat. No. 1327*a–z*; I. U. Cat. No. 11810.)

Twelve specimens, 37–59 mm. Gluck Island at Rockstone. (C. M. Cat. No. 1328*a–c*; I. U. Cat. No. 11806.)

Five specimens, 41–56 mm. Crab Falls. (C. M. Cat. No. 1329*a–b*; I. U. Cat. No. 11808.)

[39] One of these has the lateral line interrupted.

[40] Out of twenty-four in condition to be examined two have the lateral line complete on both sides; two have it complete on one side; fourteen have the lateral line incomplete, developed on from eleven to twenty-three scales, and in the remaining six it is interrupted.

[41] Lateral line developed on from twelve to twenty scales.

[42] Lateral line developed on from nine to eleven scales.

[43] Lateral line incomplete.

Nineteen specimens, 33–46 mm. Konawaruk. (C. M. Cat. No. 1330*a–e*; I. U. Cat. No. 11803.)

Forty-one specimens, 35–66 mm. Tumatumari. (C. M. Cat. No. 1331*a–j*; I. U. Cat. No. 11809.)

Over one hundred specimens, 24–68 mm. Erukin. (C. M. Cat. No. 1332*a–z*; I. U. Cat. No. 11801.)

One specimen, 63 mm. Amatuk Cataract. (C. M. Cat. No. 1333*a*.)

Three specimens, 38–40 mm. Twoca Pan, Rupununi. (C. M. Cat. No. 1334*a*.)

Head 3.7–3.8; depth 2.6–3.3; D. 11; A. 23–24; scales 5–34–3.5; eye 2.5–2.75; interorbital about 3 in the head.

No caudal spot; a very narrow silvery band overlying a dark line; a well-defined humeral spot above the third, fourth, and fifth scales of the lateral line. Vertical fins in life more or less tinged with red.

186. Mœnkhausia copei (Steindachner).

Tetragonopterus copei Steindachner, "Flussfische Südamerika's," iv, 1882, 35, pl. 6, fig. 6 (Santarem).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 53.

Mœnkhausia copei Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 438.

Twenty-six specimens, 30–56 mm. Wismar. (C. M. Cat. No. 1321*a–e*; I. U. Cat. No. 11824.)

Eleven specimens, 33–56 mm. Gluck Island at Rockstone. (C. M. Cat. No. 1322*a–e*; I. U. Cat. No. 11821.)

Fifty-three specimens, 27–55 mm. Rockstone. (C. M. Cat. No. 1323*a–j*; I. U. Cat. No. 11820.)

Forty-two specimens, 35–45 mm. Twoca Pan, Rupununi. (C. M. Cat. No. 1324*a–j*; I. U. Cat. No. 11823.)

Head 3.66–4; depth 3.33–3.66; D. 11; A. 18–20; scales 5–32 to 34–3.5; eye 2.5–2.75 in the head, interorbital 3 or a little more.

No caudal spot; a very narrow silvery band overlying a narrow dark band, which becomes wider in front, sometimes expanded into a humeral spot over the fourth scale of the lateral line; caudal rose-colored or rusty in life.

Pristella Eigenmann.

Pristella Eigenmann, Bull. Mus. Comp. Zool., LII, 1908, 99.

Type, *Holopristes riddlei* Meek.

This genus differs from *Hemigrammus* much as *Hemibrycon* differs from *Astyanax*.

Lateral line incomplete; caudal scaled for at least one-third of its length; maxillary with teeth along nearly the entire anterior edge; gill-rakers long, setiform; gill-membranes free from each other and from the isthmus.

KEY TO THE SPECIES OF PRISTELLA.

a. Depth 2.3–2.75; A. 20–24; dorsal, anal, and very frequently ventral, each with a conspicuous black spot; no caudal spot. . . . . riddlei.

aa. Depth 3.5; A. 16–18; caudal with a spot on the base of its middle rays, other fins all plain. . . . . aubynei.

187. **Pristella riddlei** (Meek). (Plate XLV, fig. 3.)

Holoprístes riddlei MEEK, Proc. U. S. Nat. Mus., XXIII, 1907, 11 (Los Castillas, Venezuela).—EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 437.

Fifty-six specimens, 12–29 mm. Wismar. (C. M. Cat. No. 1307*a–j*; I. U. Cat. No. 11798.)

Eight specimens, 37–47 mm. Georgetown trenches. (C. M. Cat. No. 1308*a–b*; I. U. Cat. No. 11800.)

Two hundred and thirty-three specimens, 26–45 mm. Botanic Garden, Georgetown. (C. M. Cat. No. 1309*a–z*; I. U. Cat. No. 11796.)

Five specimens, Christianburg Canal. (C. M. Cat. No. 1310*a*; I. U. Cat. No. 11799.)

Three specimens, Kumaka, Demerara River. (C. M. Cat. No. 1311*a*; I. U. Cat. No. 11797.)

Head 3.75–4; depth about 2.3–2.75; D. 11; A. 20–24; scales 5–32–3, six to eight with pores; eye 2.64, snout 4.12, interorbital about 2.5 in the head.

A humeral spot over the third and fourth scales of the lateral line; no caudal spot; dorsal, anal, and ventrals each with a conspicuous, jet-black spot; dorsal spot not extending upon the last ray, and leaving base and tips of rays hyaline; anal spot covering the third and fourth fifth of the rays forming the anterior lobe; ventral spot leaving the outer and inner rays and bases and tips of all the rays hyaline. Very brilliant in life, translucent, the caudal bright red, upper parts tinged with red, basal part of dorsal and anal lobe below the black spots bright yellow, the distal parts milk-white.

188. **Pristella aubynei** Eigenmann. (Plate XLV, fig. 4.)

Pristella aubynei EIGENMANN, Ann. Carnegie Mus., VI, 1909, 24; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 437.

Type, 50 mm. Lama Stop-Off. (Carnegie Museum Catalog of Fishes No. 1042.)

Cotypes, two hundred and three specimens, 20–50 mm. Lama Stop-Off. (C. M. Cat. No. 1043*a–z*; I. U. Cat. No. 11735.)

Cotypes, fifty specimens, 28–46 mm. Cane Grove Corner. (C. M. Cat. No. 1044*a–j*; I. U. Cat. No. 11736.)

Cotypes, twenty-one specimens, 35–49 mm. Maduni Stop-Off. (C. M. Cat. No. 1045*a–e*; I. U. Cat. No. 11737.)

This species is very abundant in the canal from Cane Grove Corner to Maduni Creek Stop-Off. It is named for Mr. Saint Aubyne, whose guest I was at Lama Stop-Off, and who did everything in his power to further the interests of my fishing expedition.

This species is placed in the genus with *Pristella riddlei*, because in the technical characters they agree. There is every probability that they are not immediately descended from the same ancestor.

Head 3.75; depth 3.5; D. 10; A. 16–18; scales 6–31 to 33–3, rarely 4; seven to nine pores in the lateral line; eye 2.33; interorbital 3.

Elongate, heavy forward; ventral profile curved more than the dorsal, which is nearly straight to the dorsal fin, not depressed over the eye; preventral area broad, rounded, postventral area keeled; predorsal area narrowly rounded.

In life the base of the upper caudal lobe is red, that of the lower yellow, and there is some yellow on the under side of the caudal peduncle and in front of the anal. A circular spot about as large as the eye on the base of the middle caudal rays. A dark line in front of the dorsal, and a series of spots behind it. A well-defined humeral spot on and over the second and third scales of the lateral line.

Hemigrammus Gill.[44]

Hemigrammus Gill, Ann. Lyc. Nat. Hist. N. Y., VI, 1858, 60.

Type, *Hemigrammus unilineatus* Gill.

Small or minute Tetragonopterid characins with two rows of notched teeth in the upper jaw, a single row of similar teeth on the mandible, and a few teeth on the upper part of the maxillary; lateral line incomplete; caudal scaled.

This genus is *Mœnkhausia* with an incomplete lateral line.

Key to the Guiana Species of Hemigrammus.

a. Dorsal with a well-defined black spot. Anal with an intense black bar from a little in front of the base of first ray to the tips of the fourth and fifth rays. Humeral spot vertically elongate, often faint and

[44] The account of this genus is compiled from a manuscript by Mrs. Marion Durbin Ellis.

sometimes lacking. Second suborbital leaving a narrow naked area below. Six small, tricuspid, and conical teeth in the maxillary. D. 11; A. 23 to 27; scales 5–32 to 34–3 to 4.5....**unilineatus.**

aa. Dorsal without well-defined black markings (see also *elegans*).

b. No humeral or caudal spot. Depth 3.33 to 3.75. A wide lateral streak from the middle of the caudal to the head and another narrower streak from above the anterior anal rays to the mandible, without black chromatophores; the sides and back everywhere else dusky. Anal lobe and distal half of dorsal lobe dusky. Second suborbital about one-half as wide as the eye, without naked margins. Maxillary with two to four, three- to five-pointed teeth. D. 11; A. 20 to 22; scales 5–31 to 34–3 to 3.5.....**erythrozonus.**

bb. No humeral spot, caudal spot not as wide as the caudal peduncle, continued forward on the latter, faintly continuous with the lateral stripe, and continued backward only on the middle rays. No silvery area on the caudal peduncle. Second suborbital in contact with the preopercle. Head 4. Maxillary with two to four conical or tricuspid teeth. D. 11; A. 22–24; scales 5–32 to 34–2 to 3.5.....**rodwayi.**

bbb. Humeral and caudal spots both developed. Dorsal equidistant from base of middle caudal rays and tip of snout, or nearer the caudal.

c. Origin of the dorsal equidistant from front of eye and caudal. Origin of the anal on the vertical from the last dorsal ray. Second suborbital leaving very narrow naked margins below and behind. Humeral spot distinct, vertically elongate, surrounded by a bright area, often with a second elongated spot behind the bright area. An iridescent spot on the upper half of the caudal peduncle. Caudal spot often continued along the edge of each caudal lobe. Maxillary with two or three conical or tricuspid teeth. Depth 2.5; D. 11; A. 22 to 26; scales 5–30 to 33–3 to 3.5.....**ocellifer.**

cc. Origin of dorsal slightly nearer middle caudal rays than to tip of snout. Origin of anal on the vertical from the first to the third scale behind the dorsal. Caudal spot wider than long, not continued backward on the caudal peduncle. Humeral spot small. Maxillary with two four- or five-pointed teeth. Second suborbital leaving narrow naked margins below and behind. D. 11; A. 15–17; scales 5–30–3.....**iota.**

bbbb. Humeral spot present; no caudal spot. (Humeral spot sometimes faint or lacking.)

d. Anal rays 19–26.

e. Compressed. Depth 3.75. Humeral spot faint or diffuse, roundish. Second suborbital leaving narrow naked margins behind and below. Mouth moderately large. Maxillary equal to eye. First seven anal rays dusky. D. 11; A. 19–22; scales 5–30 to 33–3. Caudal not deeply scaled, three to five scales on each lobe.....**orthus.**

ee. Subcylindrical; eye a little longer than broad, 2.25 in the head; snout comparatively long, 3.25 in the head. Maxillary nearly straight, with three to six tricuspid or conical teeth. Humeral spot small and intense. D. 11; A. 17–20; scales 5–30 to 34–3.....**cylindricus.**

dd. Anal rays 12 to 14. Depth 3.2 to 3.5. Humeral spot diffuse. A wide silvery lateral stripe. Each dorsal scale marked with an intense dark spot. Second suborbital leaving considerable naked margins behind and below. Maxillary with two or three six- to seven-pointed teeth. D. 11; A. 12–14; scales 5–30 to 32–3.....**analis.**

189. **Hemigrammus unilineatus** Gill. (Plate XLVIII, fig. 1.)

Pœcilurichthys hemigrammus unilineatus Gill, Ann. Lyc. Nat. Hist. N. Y., VI, 1858, 60 (Trinidad).—Günther, Catalogue, V, 1864, 317.

Tetragonopterus unilineatus Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 54.—Ulrey, Ann. N. Y. Acad. Sci., VIII, 1895, 285 (Pará, Brazil). —Gilbert, Proc. Wash. Acad. Sci., II, 1900, 163 (Pernambuco).

Tetragonopterus hemigrammus unilineatus Regan, Proc. Zool. Soc. London, 1906, 384 (Trinidad).

Hemigrammus unilineatus Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 436.

Five specimens, 28–38 mm. Pará, Brazil. (I. U. Cat. No. 5779.)

One specimen, 40 mm. Los Castillos. (I. U. Cat. No. 10801.)

One hundred and ten specimens, 35–48 mm. Creek in Mora Passage. (C. M. Cat. No. 1440*a–j*; I. U. Cat. No. 11898.)

Twenty-two specimens, 31–41 mm. Creek in Barima River. (C. M. Cat. No. 1441*a–e*; I. U. Cat. No. 11899.)

Eighty-six specimens, 23–48 mm. Aruka River. (C. M. Cat. No. 1442*a–j*; I. U. Cat. No. 11900.)

Seven specimens, 32–52 mm. Issorora mud creek. (C. M. Cat. No. 1443*a–b*; I. U. Cat. No. 11901.)

Sixteen specimens, 36–53 mm. Mud-flats in Demerara River, below Wismar. (C. M. Cat. No. 1444*a–e*; I. U. Cat. No. 11902.)

One specimen, 37 mm. Georgetown trenches. (C. M. Cat. No. 1445*a*.)

Four specimens, 41–47 mm. Wismar. (C. M. Cat. No. 1446*a*; I. U. Cat. No. 11903.)

Five specimens, 35–47 mm. Kumaka, Demerara. (C. M. Cat. No. 1447*a–b*; I. U. Cat. No. 11904.)

Distinguished by having an oblique black line from the base of the first to the tip of the fourth and fifth anal rays. Six conical and tricuspid teeth in the maxillary. Second suborbital leaving a narrow naked margin below.

Head 3.75; depth 2.75–3; D. 11; A. 23–27; scales 5–32 to 34–3 to 4.5; eye 2.25 to 2.5 in the head; interorbital narrower than the eye, 3 in the head.

Dorsal black, except the tips of the anterior five or six rays. An oblique black line on the anal from the base of the first to the tips of the fourth and fifth rays. Humeral spot vertically elongate, often faint and sometimes lacking. No caudal spot. Lateral stripe narrow. Scales of the back outlined with dusky.

190. Hemigrammus erythrozonus Durbin. (Plate XLVIII, fig. 2.)

Hemigrammus erythrozonus Durbin, Ann. Carnegie Mus., VI, 1909, 56.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 436.

Type, 32 mm. Erukin. (Carnegie Museum Catalog of Fishes No. 1448.)

Cotypes, thirty-two specimens, 21–33 mm. Erukin. (C. M. Cat. No. 1449*a–e*; I. U. Cat. No. 11905.)

Head 3.75; depth 3.33 to 3.75; D. 11; A. 20–22; scales 5–31 to 34–3–3.5; eye 2.5 in head; snout two-thirds of eye. Interorbital less than eye, about 2.75 in head.

No true humeral spot; pores and margins of the first three or four scales in the lateral line heavily outlined with dusky: a group of large chromatophores just behind the eye. Web of distal half of dorsal, almost all of the caudal, all of the ventrals and pectorals, and the web between the first seven anal rays, dusky. Often a faint dark spot at the base of each caudal lobe, but no true caudal spot. Scales of the back and upper one-third of the sides outlined with dusky. A broad stripe extending from the head to the caudal and half-way to the end of the middle caudal rays without chromatophores, cherry-red in life. Below this lateral stripe a dusky stripe, two scales in width, extends the length of the body. The belly and a streak on the sides from just above the bases of the anterior ten anal rays to the mandible are without chromatophores. Base of the anal and under side of the caudal peduncle black to dusky. Lips dusky. Dorsal lobe and upper part of the iris cherry-red in life.

191. **Hemigrammus rodwayi** Durbin. (Plate XLVIII, fig. 3.)

Hemigrammus rodwayi Durbin, Ann. Carnegie Mus., VI, 1909, 58.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 436.

Type, 46 mm. Georgetown trenches. (Carnegie Museum Catalog of Fishes No. 1450.)

Cotypes, one hundred and eighty-three specimens, 38–49 mm. Georgetown trenches. (C. M. Cat. No. 1451*a–z*; I. U. Cat. No. 11906.)

Cotypes, one hundred and twelve specimens, 28–53 mm. Botanic Garden. (C. M. Cat. No. 1452*a–z*; I. U. Cat. No. 11907.)

Cotypes, four specimens, 24–26 mm. Mud creek in Aruka. (C. M. Cat. No. 1453*a–b*; I. U. Cat. No. 11908.)

Cotypes, seven specimens, 34–40 mm. Creek in Barima River. (C. M. Cat. No. 1454*a–b*; I. U. Cat. No. 11909.)

Head 4; depth 2.75–3; D. 11; A. 22–24; scales 5–32 to 34–2.5 to 3.5; eye 2–2.33 in head; snout two-thirds of the eye, interorbital very nearly equal to eye, 2.4 to 2.5 in head.

No shoulder spot. A silvery lateral stripe extends from the caudal to about

the vertical from the first dorsal rays, and is continued forward by a few large scattered chromatophores. The black caudal spot usually extends nearly or entirely to the end of the middle caudal rays. Scales of the back and sides above the lateral stripe outlined with pigment, an olive stripe along the back. All fins somewhat dusky. Males with a cherry-red spot on the base of each caudal lobe; anterior margin of anal with a white bar, broadest towards the tip, the rest of anal and the base of dorsal tinged with red. Females with yellow on caudal, anal, and dorsal in place of the red of the males. The white bar on the anal is lacking in females.

192. **Hemigrammus ocellifer** Steindachner. (Plate XLVIII, fig. 4.)

Tetragonopterus ocellifer Steindachner, "Flussfische Südamerika's," iv, 1882, 32, pl. 7, fig. 5 (Villa Bella; Cudajas).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 54.—Ulrey, Ann. N. Y. Acad. Sci., VIII, 1895, 286 (Amazon and Solimoes basin).

Holopristis ocellifer Eigenmann, Smiths. Misc. Coll., Quarterly Issue, XLV, 1903, 145.

Hemigrammus ocellifer Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 436.

Thirty-three specimens, 28–44 mm. Obidos (Col. Bentos, Thayer Expedition). (Mus. Comp. Zool. Cat. No. 20842, part.)

One specimen, 38 mm. Curupira (Maj. Cotinho). (Mus. Comp. Zool. Cat. No. 21017.)

Sixteen specimens, 28–37 mm. Tabatinga (M. Bourget, Thayer Expedition). (Mus. Comp. Zool. Cat. No. 20774.)

Five specimens, 31–36 mm. Cudajas (Thayer and Bourget). (Mus. Comp. Zool. Cat. No. 20969.)

One hundred and nine specimens, 26–37 mm. Gluck Island. (C. M. Cat. No. 1455*a–z*; I. U. Cat. No. 11910.)

Three specimens, small, Konawaruk. (C. M. Cat. No. 1456*a*; I. U. Cat. No. 11911.)

Four specimens, 28–29 mm. Malali. (C. M. Cat. No. 1157*a–b*; I. U. Cat. No. 11912.)

Humeral spot bounded in front and behind by bright bars as wide as the spot, and a second, less distinct, dark bar just behind it.

Head 3.25 to 3.5; depth 2.5 to 2.75; D. 10 or 11; A. 22 to 26; scales 5–30 to 33–3 to 3.5; eye 2.25 to 2.5 in head; snout little more than half of eye; interorbital about equal to eye.

Humeral spot distinct, vertically elongate, paralleled in front and behind by a bright bar nearly as wide as the spot; a secondary, fainter, dark bar behind the posterior bright bar. A black caudal spot not extending much, if at all, upon the middle caudal rays; a bright ring around the entire caudal peduncle. The base of the caudal lobes and upper part of the peduncle rusty red in life. Dorsal orange-tinged in life; caudal and anal rays tipped with dusky, distal third of second anal rays white. Anal, ventrals, and pectorals yellow in life. Scales of the back outlined with pigment; a few large chromatophores scattered over the cheeks.

193. **Hemigrammus iota** Durbin. (Plate XLIX, fig. 1.)

Hemigrammus iota Durbin, Ann. Carnegie Mus., VI, 1909, 60.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 436.

Type, 18 mm. Gluck Island. (Carnegie Museum Catalog of Fishes No. 1458.)

Cotypes, four specimens, 19–21 mm. Rockstone. (C. M. Cat. No. 1460*a*; I. U. Cat. No. 11914.)

Cotypes, seven specimens, 18–21 mm. Gluck Island. (C. M. Cat. No. 1459*a–b*; I. U. Cat. No. 11913.)

Head 3.6; depth 3.4; D. 11; A. 15–17; scales 5–30–3; eye 2.33–2.5; snout three-fifths of the eye. Interorbital slightly less than the eye, 2.8 in the head.

Humeral spot conspicuous, black, vertically elongate, surrounded by a small light area; a faint secondary spot. Caudal spot variable in intensity, not extending upon the caudal rays, and not continuous with the narrow black lateral stripe, which is overlaid with silvery. Each scale of the postdorsal region marked with a round dark spot in addition to a few scattered chromatophores. Scales of the predorsal region with less distinct round spots. Scales of the sides above the lateral stripe outlined with dusky. Caudal in life with an orange spot on the base of each lobe.

194. **Hemigrammus orthus** Durbin. (Plate XLVIII, fig. 5.)

Hemigrammus orthus Durbin, Ann. Carnegie Mus., VI, 1909, 61.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 436.

Type, 28 mm. Tukeit. (Carnegie Museum Catalog of Fishes No. 1477.)

Cotypes, seventeen specimens, 22–30 mm. Tukeit. (C. M. Cat. No. 1478*a–f*; I. U. Cat. No. 11912.)

Cotypes, twenty-five specimens, 14–21 mm. Gluck Island. (C. M. Cat. No. 1479*a–f*; I. U. Cat. No. 11922.)

Cotype, one specimen, 27 mm. Essequibo below Packeoo. (C. M. Cat. No. 1480.)

Head 3.75; depth 3.75; D. 11; A. 19 to 22; scales 5-30 to 33-3; eye 2.5 in the head; interorbital not quite equal to the eye, about 3 in the head.

A diffuse, round, or somewhat vertically elongate, humeral spot. A dark lateral stripe, heaviest behind the origin of the anal, but not reaching the base of the caudal. A black line at the base of the posterior anal rays, not continuous with that at the base of the first seven. Dorsal, caudal, first seven rays of the anal, and first two or three rays of ventrals, dusky. Scales of the back dusky, each often bearing a single black spot.

195. **Hemigrammus cylindricus** Durbin. (Plate XLIX, fig. 3.)

Hemigrammus cylindricus Durbin, Ann. Carnegie Mus., VI, 1909, 62.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 436.

Type, 57 mm. Tumatumari. (Carnegie Museum Catalog of Fishes No. 1461.)

Cotypes, six specimens, 35–58 mm. Tumatumari. (C. M. Cat. No. 1462*a*; I. U. Cat. No. 11915.)

Cotypes, eleven specimens, 46–54 mm. Crab Falls. (C. M. Cat. No. 1163*a–c*; I. U. Cat. No. 11916.)

Cotypes, twenty specimens. Rockstone. (C. M. Cat. No. 1464*a–e*; I. U. Cat. No. 11917.)

Cotype, one specimen, 45 mm. Gluck Island. (C. M. Cat. No. 1465*a*.)

Head 3.3–3.66; depth 3.66–4.66; D. 11; A. 17 to 20; scales 5–30 to 34–3; eye large, slightly longer than wide, 2.75 in the head; interorbital almost flat, almost equal to the eye, 3 in the head.

Humeral spot small, roundish or roughly triangular, often intense. A black line at the base of the anal. A narrow black lateral stripe. No true caudal spot, but sometimes a dusky spot at the base of each lobe.

196. **Hemigrammus analis** Durbin. (Plate XLIX, fig. 6.)

Hemigrammus analis Durbin, Ann. Carnegie Mus., VI, 1909, 64.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 436.

Type, 35 mm. Rockstone. (Carnegie Museum Catalog of Fishes No. 1466.)

Cotypes, twenty-one specimens, 24–29 mm. Gluck Island. (C. M. Cat. No. 1468*a–e*; I. U. Cat. No. 11919.)

Cotypes, seventy-three specimens, 19–36 mm. Rockstone. (C. M. Cat. No. 1467*a–j*; I. U. Cat. No. 11918.)

Cotypes, two specimens, 29–35 mm. Wismar. (C. M. Cat. No. 1469*a*; I. U. Cat. No. 11920.)

Head 3.5–3.75; depth 3.25–3.50; D. 11; A. 12–14; scales 5–30 to 32–3; eye 2.33 in the head; snout two-thirds of the eye; interorbital less than the eye, about 2.75 in the head.

Humeral spot distinct but not heavy, not conspicuously elongate. Lateral stripe (probably red in life) the width of one scale, not so intense as the humeral spot, expanded on the caudal peduncle, but not extending upon the fin; scales overlying the lateral stripe distinctly silvery. First five anal rays, the caudal, and all of the dorsal, dusky. Each median dorsal scale with a roundish dark spot. Scales of the upper half of the sides outlined with dusky. A few chromatophores scattered about the base of the anal and aggregated so as to form a small dark spot or line on the ventral side of the caudal peduncle.

Hyphessobrycon Durbin.

Hyphessobrycon Durbin, Bull. Mus. Comp. Zool., LII, 1908, 100.

Type, *Hyphessobrycon compressus* Meek.

Having the characters of *Hemigrammus*, but the caudal naked.

The account of this genus is compiled from a manuscript by Mrs. Marion Durbin Ellis.

Key to the Guiana Species of Hyphessobrycon.

a. Dorsal with a well-defined black spot.

b. Humeral spot present; anal not marked with black, or with black only on the tips of the rays. Second suborbital covering the entire cheek. Last few, and frequently the first few, anal rays with black on or near their tips. Humeral spot very small. Depth 3.8; head at base of occipital process three-fourths the greatest depth. Maxillary with two or three tricuspid teeth; inner row of premaxillary of five teeth. D. 11; A. 26; scales 5–32 to 34–3. . . . . **minor.**

bb. No humeral or caudal spot; the black dorsal spot margined with white above. Maxillary with four to six tricuspid or conical teeth. D. 11; A. 26 or 27; scales 5–31 to 33–3. . . . . **rosaceus.**

aa. Dorsal plain.

c. No humeral spot.

d. A small black chevron at the base of each caudal lobe. A row of small black spots along the base of the anal. Maxillary with six small teeth. Ten to twelve small conical or tricuspid teeth in the second row of the premaxillary. D. 11; A. 19 or 20; scales 4–31–3. . . **riddlei.**

dd. Caudal sometimes plain, sometimes with a faint spot. Maxillary with two minute teeth. Premaxillary with five three- to five-pointed teeth in the second row. D. 10 or 11; A. 17 to 24; scales 5–29 to 34–3.5 to 4. . . . . **gracilis.**

ddd. Maxillary with two or three broad, five- to seven-pointed teeth; premaxillary with five five- to seven-pointed teeth in the inner row. A black lateral stripe, somewhat diffused in the humeral region; caudal spot continued on the middle rays, but not to their end. D. 11; A. 16 or 17; scales 5–30 to 33–3. . . . . **minimus.**

cc. Both humeral and caudal spots developed. (See also *minimus*.) Lower part of caudal peduncle dark, the upper part of the peduncle light; second suborbital broad, in contact, or nearly in

contact, with the preopercular limb. Third anal ray not extending to the base of the last ray. Maxillary with five to seven very narrow conical and tricuspid teeth. D. 11; A. 17 to 20; scales 6–33 to 34–4.....eos.

ccc. No caudal spot; humeral spot vertically elongate, not continued backwards; a black line along the middle of the sides; mouth moderate, maxillary with three broad four- to seven-pointed teeth. D. 11; A. 26–31; scales 6–33–4.....stictus.

197. **Hyphessobrycon minor** Durbin. (Plate XLIX, fig. 5.)

Hyphessobrycon minor Durbin, Ann. Carnegie Mus., VI, 1909, 65.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 436.

Type, 19 mm. Konawaruk. (Carnegie Museum Catalog of Fishes No. 1189.)

Cotypes, two specimens, 21–25 mm. Konawaruk. (I. U. Cat. No. 11767.)

Head 3.5; depth 3.8; D. 11; A. 26 to 28; scales 5–32 to 34–3; eye 2.5 in the head; interorbital less than the eye, about 3 in the head.

Humeral spot small, black, vertically elongate. No caudal spot. Lateral stripe extremely narrow and line-like, interrupted, and very faint. Scales of the back and upper half of the sides outlined with dusky. Dorsal with an intense black bar on the outer half of the anterior six or seven rays. The tips of the second, third, and fourth rays, and a streak directly below the black bar, white. Last half of anal rays with blackish tips. Caudal, anal, ventrals, and pectorals a little dusky.

198. **Hyphessobrycon rosaceus** Durbin. (Plate L, fig. 1.)

Hyphessobrycon rosaceus Durbin, Ann. Carnegie Mus., VI, 1909, 67.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 436.

Type, 35 mm. Gluck Island. (Carnegie Museum Catalog of Fishes No. 1190.)

Cotypes, twenty-five specimens, 19–38 mm. Gluck Island. (C. M. Cat. No. 1191*a–e*; I. U. Cat. No. 11768.)

Cotype, one specimen, 34 mm. Rockstone. (C. M. Cat. No. 1192*a*.)

Head 3.33–3.66; depth 2.75; D. 11; A. 26 or 27; scales 5–31 to 33–3; eye 2.5 in the head; interorbital almost equal to the eye, 2.6 in the head.

Humeral and caudal spots lacking. Scales of the back outlined with dusky. The entire sides (except over the body cavity) with scattered chromatophores, which are a little thicker on the caudal peduncle and on the third and fourth scales of the lateral line and the three scales above them. The chromatophores are thinner over a small vertically elongate area immediately behind the humeral area just described. The lateral stripe is very slender, extending entirely to the

caudal. Dorsal with a round, intensely black spot on the first seven rays, the tips of the second and third rays white. The distal half of the longest anal ray and the tip of the next ray are also white. All the fin-rays dusky. In life, with a general rosy tinge, especially above the anal, and the base of caudal lobes and ventrals. Anal lobe and base and tip of dorsal lobe bright orange.

199. Hyphessobrycon riddlei Meek.

Hemigrammus riddlei Meek, MS., in Eigenmann and Ogle, Proc. U. S. Nat. Mus., XXXIII, 1907, 13 (Los Castillos).

Hyphessobrycon riddlei Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 436.

One specimen, 23 mm. Rockstone. (C. M. Cat. No. 1248.)

Depth 3.8; D. 11; A. 20; scales 4–31–3; eye 3 in the head.

Frontal fontanel triangular, very small, narrower than the parietal, and half the length of the latter without the occipital groove. Second suborbital in contact with the preopercle. Mouth small; maxillary very little shorter than the eye, about 3 in the head, with six conical teeth; premaxillary with twelve small teeth in the inner row and two in the outer.

Lateral line with pores on the anterior half of the scales.

Origin of the dorsal equidistant between the snout and the caudal. Origin of the anal on the vertical from the first scale behind the dorsal; anal slightly falcate.

A small dark spot at the base of each caudal lobe, and a row of small black spots along the base of the anal; no humeral spot; no fin markings.

200. Hyphessobrycon gracilis (Reinhardt). (Plate XLIX, fig. 4.)

Tetragonopterus gracilis Reinhardt, in Lütken, Overs. Dan. Vidensk. Selsk. For., 1874, 133 (Lagoa Santo).—Lütken, Vidensk. Selsk. Skr., (5), XII, 1875, 217, pl. 5, fig. 16 (Rio das Velhas).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 53.—Ulrey, Ann. N. Y. Acad. Sci., VIII, 1895, 286.—Boulenger, Boll. Mus. Zool. ed. Anat. Comp. Torino, X, 1895, 3 (Villa Rica).

Hemigrammus gracilis Eigenmann and Ogle, Proc. U. S. Nat. Mus., XXXVIII, 1907, 15 (Lagoa Santa).

Hyphessobrycon gracilis Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 436.

Tetragonopterus schmardæ Ulrey (not of Steindachner), Ann. N. Y. Acad. Sci., VIII, 1895, 286 (Pará).

Nineteen hundred and seventy-seven specimens, 24–30 mm. Dr. Justa, Brazil (Maj. Cotinho, Thayer Exp.). (Mus. Comp. Zool. No. 21008.)

Four specimens, 20–24 mm. Pará, Brazil. (I. U. Cat. No. 5176.)

One specimen, 27 mm. Lower Amazon. (I. U. Cat. No. 5177.)

One specimen, 44 mm. Içá (James). (Mus. Comp. Zool. No. 20812.)

Sixteen specimens, 19–24 mm. Gluck Island. (C. M. Cat. No. 1247; I. U. Cat. No. 11772.)

Head 3–3.5; depth 3–3.5; D. 10, occasionally 11; A. 17–24; scales 5–29 to 34–3.5 or 4, six to thirteen pores in the lateral line; eye 2–2.5 in the head; interorbital little less than the eye, 2.7–3 in the head.

All of the fins hyaline, except for the occasional dim spot at the base of the caudal, which never reaches the end of the caudal rays. A distinct silvery lateral stripe subtending a very inconspicuous, narrow, brown, or black stripe. The scales, especially those of the lateral line and the series above and below it, are iridescent.

201. **Hyphessobrycon minimus** Durbin. (Plate XLIX, fig. 2.)

Hyphessobrycon minimus Durbin, Ann. Carnegie Mus., VI, 1909, 68.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 436.

Type, 18 mm. Cane Grove Corner. (Carnegie Museum Catalog of Fishes No. 1193.)

Cotypes, 16–21 mm. Cane Grove Corner. (I. U. Cat. No. 11769.)

Head 3.33–3.66; depth 3.5–3.75; D. 11; A. 16 or 17; scales 5–30 to 33–3; eye 2+ in head; snout less than eye; interorbital less than eye, about 3 in head.

Caudal spot intensely black, roundish, and scarcely, if at all, continued upon the caudal rays. Humeral spot lacking, but the intense narrow black lateral stripe widened somewhat in the humeral region. Scales of the back and sides, above the lateral stripe, heavily outlined with dusky. Fins without distinct markings of black or white. Sides over and below the lateral stripe marked with iridescent steel-blue. Preopercle also with blue iridescence.

202. **Hyphessobrycon eos** Durbin. (Plate L, fig. 2.)

Hyphessobrycon eos Durbin, Ann. Carnegie Mus., VI, 1909, 69.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 437.

Type, 36 mm. Creek between Potaro Landing and Kangaruma. (Carnegie Museum Catalog of Fishes No. 1194.)

Cotypes, twenty-four specimens, 35–42 mm. Creek between Potaro Landing and Kangaruma. C. M. Cat. No. 1196*a–e*; I. U. Cat. No. 11770.)

Cotypes, forty-three specimens, 19–34 mm. Tukeit. (C. M. Cat. No. 1195*a–j*; I. U. Cat. No. 11771.)

Head 3.25–3.33; depth 2.5–2.7; D. 11; A. 17–20; scales 6–33 or 34–4; eye 2.5 in the head; snout about 2 in the eye; interorbital almost equal to the eye, 2.75 in the head. Maxillary teeth mostly conical, largest teeth with never more than three points. Maxillary equal to the eye.

Humeral spot very faint, vertically elongate, very near the head. Lateral stripe narrow and very indistinct. Caudal spot intensely black, covering the ventral two-thirds of the caudal peduncle, a little narrower in front than on the vertical from the origin of the lower caudal lobe, not extending upon the caudal rays. Top of head and dorsal scales very dark; scales of upper half of the sides heavily outlined with dusky. All fin-webs dusky. Numerous chromatophores scattered over the rest of the body, especially large and prominent on the cheeks.[45] Anterior half of anal, base of anal, sides just above the anal, and ventrals reddish; caudal red or orange to deep yellow, lower lobe often more colored than the upper one; base of dorsal, pectorals, cheeks, and under part of head yellow.

203. Hyphessobrycon stictus Durbin. (Plate XLIX, fig. 7.)

Hyphessobrycon stictus Durbin, Ann. Carnegie Mus., VI, 1909, 71.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 437.

Type, 38 mm. Lama Stop-Off. (Carnegie Museum Catalog of Fishes No. 1197.)

Cotypes, one hundred and eight specimens, 25–40 mm. Maduni Creek. (C. M. Cat. No. 1435*a–j*; I. U. Cat. No. 11895.)

Cotypes, one hundred and sixteen specimens, 22–39 mm. Lama Stop-Off. (C. M. Cat. No. 1436*a–t*; I. U. Cat. No. 11896.)

Cotype, one specimen. Rockstone. (C. M. Cat. No. 1437.)

Cotypes, ten specimens. Christianburg Canal. (C. M. Cat. No. 1438*a–e*; I. U. Cat. No. 11897.)

Cotype, one specimen. Cane Grove Corner. (C. M. Cat. No. 1439.)

Head 3.5–3.8; depth 2.75–3.25; D. 11; A. 26–31; scales 6–33 to 35–4; eye 2.25 in head; snout 2 in eye; interorbital less than eye, about 2.5 in head.

Humeral spot round, very intense, surrounded by a light ring, very frequently with a less intense dark bar extending obliquely downward and forward, and another shorter one extending obliquely upward and forward. A faint secondary humeral spot the width of two scales behind the first. Lateral stripe sharp and

[45] All specimens at hand were preserved in formalin and so have the black pigment emphasized.

very narrow, not reaching the caudal; no caudal spot. Dorsal scales outlined with dusky. Top of head very thickly covered with chromatophores. Fins all a little dusky. Sides silvery, iridescent. Caudal peduncle to in front of adipose, the adipose and caudal (except the lobes) very rich cherry-red. Caudal lobes, anal, and dorsal canary-yellow.

Dermatocheir Durbin.

Dermatocheir Durbin, Ann. Carnegie Museum, VI, 1909, 55.

This genus differs from its nearest relative, *Hyphessobrycon*, in having an archaic pectoral like *Archicheir*. The pectoral consists of a fleshy lobe, surrounded by a fringe of filaments.

Type, *Dermatocheir catablepta* Durbin.

204. **Dermatocheir catablepta** Durbin.

Dermatocheir catablepta Durbin, Ann. Carnegie Mus., VI, 1909, 55.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 437.

Type unique, 18 mm. Tumatumari, above the falls. (Carnegie Museum Catalog of Fishes No. 1198.)

Head 3.5; depth 3.8; D. 11; A. 20; scales 5–33–3; eye 2.5 in the head; interorbital very slightly greater than the eye, 2.2 in the head.

Humeral spot vertically elongate, very faint. No caudal spot, but a few chromatophores at the base of each caudal lobe. Lateral stripe very dim. Scales of the back outlined with dusky. Fins without pigment.

Creatochanes Günther.

Creatochanes Günther, Catalogue, V, 1864, 318, 329.

Type, *Salmo melanurus* Bloch.

Elongate, spindle-shaped fishes, but slightly compressed, reaching a length of 157 mm. The species are very similar and have the following characters in common: premaxillary with a distinct antero-posterior extent meeting the anterior portion of the maxillary at a nearly right angle; maxillary long, slipping under the first suborbital, as well as under the preorbital, its anterior margin greatly arched above, straight, or nearly so, below; mouth large, the lower jaw freely movable; tongue but little free, fleshy. Snout and maxillary much more than half the head in length.

Lower jaw included, with five or six large equal teeth in front, each with a long median and several minute lateral cusps, the lateral teeth somewhat recurved and followed by a series of minute teeth. Premaxillary with five or six multicuspid incisor teeth in the inner row; teeth of the outer row narrower; maxillary with two multicuspid teeth.

Gill-membranes free from the isthmus; gill-rakers about 5–10.

Lateral line complete, decurved; a very narrow sheath composed of one series of minute scales along the bases of the first ten anal rays. Caudal lobes entirely naked; preventral region broadly rounded; predorsal and preventral areas each with a median series of scales; postventral area compressed; dorsal and ventrals equidistant from tip of snout; origin of anal entirely behind dorsal; adipose fin slightly in advance of end of anal; pectorals not or scarcely to ventrals; ventrals not to anal, with a small axillary scale.

Alimentary canal about equal to the length (without the caudal), with eleven large cœca; air-bladder large, the posterior portion more than twice as long as the anterior, not quite reaching anal.

KEY TO THE GUIANA SPECIES OF CREATOCHANES.

a. Maxillary extending to end of the second suborbital, its tip and posterior margin of pupil equidistant from tip of snout; suture between first and second suborbital usually extending down and back; second suborbital short, its anterior margin continued as one convex curve to the angle; normally seven, rarely eight, rows of scales between the lateral line and the dorsal; striæ of scales when present nearly parallel.

b. Caudal lobes dark, the upper darkest, with water-marks; basal spot of upper caudal lobe, as well as dorsal and anal rays, yellow; pectorals not reaching ventrals; second tooth of the premaxillary in line with the rest or moved forward; lateral stripe (in formalin specimens) diminishing in front of the dorsal, not continued to the head; very highly iridescent. Head 3.8–4; depth 3.75; D. 11; A. 26–29; scales 7–44 to 47–2.5 or 3..... **affinis.**

bb. Caudal lobes plain, a broad black band on about eight rays of the caudal, counting from the second below the middle upward, margined with red above and below; pectorals just reaching ventrals; second tooth in line with the rest or slightly withdrawn. Head 4–4.25; depth 3.4–3.5; D. 11; A. 27–29; scales 7–44 to 46 (usually 45)–3; eye 2.4–3; interorbital a little greater or a little less than eye; maxillary with one or two teeth..... **melanurus.**

aa. Maxillary not extending to end of second suborbital, its tip and middle of eye equidistant from tip of snout; suture between first and second suborbital vertical; lower jaw shorter; anterior margin of second suborbital not forming a simple convex curve to the angle above the angle of the preoperele. Normally six, very rarely seven, scales between the lateral line and the dorsal; upper caudal spot, as well as dorsal and anal rays, red; middle caudal rays and upper lobe beyond the red spot black, with water-marks; second tooth of the front row of the premaxillary withdrawn; pectorals shorter than in *affinis*, not reaching the ventrals; lateral stripe (in formalin specimens) continued to the head; less highly iridescent in life than *affinis*. Head 4.66–4.75; depth 3.4–3.8; D. 11; A. usually 31 (28–31); scales 6–45 or 46–3; articulation of lower jaw slightly in advance of the suture between the first and second suborbital; maxillary teeth 0–2..... **caudomaculatus.**

205. **Creatochanes affinis** Günther. (Plate L, fig. 3.)

"Corwi" or "Kowi" of the Wacusi Indians.

Tetragonopterus affinis Günther, Catalogue, V, 1864, 327 (British Guiana).—Ulrey, Ann. N. Y. Acad. Sci., VIII, 1895, 278.—Vaillant, Bull. Mus. d'Hist. Nat., V, 1899, 154 (Carsevenne and Carnot).

Bryconops (Creatochanes) melanurus (not of Bloch) Müller and Troschel, in Schomburgk, Reisen, III, 1848, 635 (Rupununi).—Steindachner, "Characinen des Amazonenstromes," SB. Akad. Wiss. Wien, LXXXI, 1875, 14, fig. 7 (Obidos; Rio Tapajos).

Creatochanes affinis Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 435.

Nine specimens, 70–105 mm. Aruataima. (C. M. Cat. No. 1400*a–e*; I. U. Cat. No. 11874.)

Twenty-nine specimens, 38–109 mm. Holmia. (C. M. Cat. No. 1401*a–e*; I. U. Cat. No. 11875.)

Eighteen specimens, 34–83 mm. Two hours below Holmia. (C. M. Cat. No. 1402*a–e*; I. U. Cat. No. 11876.)

Eight specimens, 29–96 mm. Savannah Landing. (C. M. Cat. No. 1403*a–b*; I. U. Cat. No. 11877.)

Twenty-seven specimens, 53–124 mm. Tukeit. (C. M. Cat. No. 1404*a–c*; I. U. Cat. No. 11878.)

Six specimens, 32–62 mm. Amatuk. (C. M. Cat. No. 1405*a–b*; I. U. Cat. No. 11879.)

Five specimens, 46–102 mm. Creek below Potaro Landing. (C. M. Cat. No. 1406*a–b*; I. U. Cat. No. 18880.)

Forty-seven specimens, 54–101 mm. Tumatumari. (C. M. Cat. No. 1407*a–b*; I. U. Cat. No. 11881.)

Five specimens, 83–96 mm. Christianburg. (C. M. Cat. No. 1407*a*; I. U. Cat. No. 11882.)

One specimen, 30 mm. Wismar. (C. M. Cat. No. 1408.)

One specimen, 58 mm. Warraputa. (C. M. Cat. No. 1409.)

Two specimens, 80–90 mm. Konawaruk. (C. M. Cat. No. 1410; I. U. Cat. No. 11883.)

One specimen, 50 mm. Bartica. (C. M. Cat. No. 1411.)

Thirty specimens, 45–88 mm. Maripieru, branch of the Ireng.[46] (C. M. Cat. No. 1412*a–j*; I. U. Cat. No. 11884.)

[46] Caudal lobes and middle rays uniformly black, bases of both lobes cherry-red or orange. Nineteen other specimens were received from a tributary of the Ireng, the name of which was not legible.

206. **Creatochanes melanurus** (Bloch). (Plate L, fig. 4.)

Salmo melanurus Bloch, Ausl. Fische, VIII, 1794, pl. 381, fig. 2 (Surinam).

Tetragonopterus melanurus Müller and Troschel, Horæ Ichth., I, 1845, 14 (Surinam).—Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 155. —Günther, Catalogue, V, 1864, 329 (British Guiana; Essequibo); Proc. Zool. Soc. London, 1868, 247 (Surinam).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 56.—Ulrey, Ann. N. Y. Acad. Sci., VIII, 1895, 274.

Creatochanes melanurus Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 435.

Bloch had three specimens which served him as types of *melanurus*, two of which belonged to this species, and one to *caudomaculatus*. The one figured was doubtless the one here called *melanurus*.

Fourteen specimens, 36–124 mm. Malali. (C. M. Cat. No. 1393*a–f*; I. U. Cat. No. 11886.)

Eighty-one specimens, 43–138 mm. Wismar. (C. M. Cat. No. 1394*a–j*; I. U. Cat. No. 11887.)

Fifteen specimens, 70–95 mm. Christianburg. (C. M. Cat. No. 1395*a–e*; I. U. Cat. No. 11888.)

Eighteen specimens, 26–100 mm. Christianburg Canal. (C. M. Cat. No. 1396*a–e*; I. U. Cat. No. 11889.)

Fifteen specimens, 63–84 mm. Near Freiheit. (C. M. Cat. No. 1397*a–e*; I. U. Cat. No. 11890.)

Twenty-nine specimens, 33–129 mm. Lama Stop-Off. (C. M. Cat. No. 1398*a–e*; I. U. Cat. No. 11891.)

Ten specimens, 52–68 mm. Madumi Creek. (C. M. Cat. No. 1399*a–c*; I. U. Cat. No. 11892.)

Readily distinguished by its eccentric black caudal band. It differs from *C. affinis* in the characters mentioned in the key.

This species is abundant in the Demerara River and Mahaica Creek basin to the coast. I did not find it in the parts of the Essequibo examined.

207. **Creatochanes caudomaculatus** Günther. (Plate L, fig. 5.)

Salmo melanurus Bloch, Ausl. Fische, VIII, 1794, 84, Pl. 381, fig. 2, part (Surinam).

Tetragonopterus caudomaculatus Günther, Catalogue, V, 1864, 330 (South America).—Ulrey, Ann. N. Y. Acad. Sci., VIII, 1895, 278.

Creatochanes caudomaculatus Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 435.

Ten specimens, 51–84 mm. Malali. (C. M. Cat. No. 1382*a–c*; I. U. Cat. No. 11867.)

Seven specimens, 68–94 mm. Mud-flats below Wismar. (C. M. Cat. No. 1383*a–b*; I. U. Cat. No. 11868.)

Two specimens, 109–125 mm. Creek below Potaro Landing. (C. M. Cat. No. 1384*a*; I. U. Cat. No. 11869.)

Two hundred and sixty-nine specimens, 40–120 mm. Tumatumari. (C. M. Cat. No. 1385*a–z*; I. U. Cat. No. 11866.)

Nine specimens, 38–60 mm. Konawaruk. (C. M. Cat. No. 1386*a–b*; I. U. Cat. No. 11870.)

Fifty-six specimens, 27–89 mm. Crab Falls. (C. M. Cat. No. 1387*a–j*; I. U. Cat. No. 11865.)

One specimen, 85 mm. Rockstone. (C. M. Cat. No. 1388.)

Twenty specimens, 22–50 mm. Gluck Island. (C. M. Cat. No. 1389*a–f*; I. U. Cat. No. 11864.)

Twenty-one specimens, 55–71 mm. Bartica. (C. M. Cat. No. 1390*a–f*; I. U. Cat. No. 11871.)

Two specimens, 69–70 mm. Koriabo Rubber Plantation. (C. M. Cat. No. 1391; I. U. Cat. No. 11872.)

Eleven specimens, 43–54 mm. Mora Passage. (C. M. Cat. No. 1392*a–c*; I. U. Cat. No. 11873.)

This species is most readily distinguished from the other species of the genus by its short maxillary, the number of scales in the lateral line, and the red caudal spot.

Creagrutus Günther.

Creagrutus Günther, Catalogue, V, 1864, 339.

Type, *Creagrutus mülleri* Günther.

Minute fishes with the teeth of the lower jaw in a single series, those on the premaxillary in three series; anal short, of not more than fourteen rays; lateral line complete; caudal naked.

208. **Creagrutus melanzonus** Eigenmann. (Plate XLV, fig. 1.)

Creagrutus melanzonus Eigenmann, Ann. Carnegie Mus., VI, 1909, 30; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 435.

Type, 44 mm. Crab Falls. (Carnegie Museum Catalog of Fishes No. 1067.)

Cotypes, two specimens, 27 mm. Warraputa. (C. M. Cat. No. 1068; I. U. Cat. No. 11753.)

Cotypes, three specimens, 25 to about 38 mm. Tumatumari. (C. M. Cat. No. 1069; I. U. Cat. No. 11754.)

Head 4; depth 4.33; D. 10; A. 11; scales 6–36–2.5; eye 2.6; interorbital 3.5.

Elongate, heaviest above middle of pectoral, the width about one-half the depth; preventral area broadly rounded, postventral rounded; predorsal area broad, with an obscure keel; a median series of about ten scales.

Occipital process very short, about one-seventh of the distance of its base from the dorsal; skull smooth, but slightly convex; frontal fontanel triangular, nearly as long as the parietal; mouth rounded, projecting beyond the lower jaw; cheeks long and low, the second suborbital about twice as long as broad, its convex margin leaving a considerable naked area, except at a point of contact with the lower limb of the operculum.

Maxillary-premaxillary border forming a simple, concave curve; horizontal extent of the premaxillary about equal to the length of the maxillary, which is equal to half the length of the eye. Nine teeth in each premaxillary, those in the maxillary similar and continuous with the last of the premaxillary teeth; outer teeth of the premaxillary conical, inner tricuspid; about seven tricuspid teeth in the dentary, of which the first three are large, the rest minute; tips of all the teeth, except those of the maxillary and those of the sides of the lower jaw, brown. Lower jaw short, less than length of eye.

Gill-rakers 4 + 10.

Scales very thin; anal sheath none; caudal lobes naked, except for a few large scales on the lower lobe; axillary scale well-developed.

Origin of dorsal in advance of the middle; origin of ventrals scarcely in advance of that of the dorsal; origin of anal behind the last ray of the dorsal; adipose slightly behind base of last anal ray; ventrals not reaching anal; pectorals not nearly to ventrals.

Straw-colored, with a bright silvery band; first suborbital, cheeks and opercle behind eye, snout, and upper part of head dotted. A continuous curved band crossing third and fourth scale of the lateral line; scales of the back margined with one to several series of dots; silvery lateral band underlaid with a dotted stripe; a small caudal spot.

Bryconamericus Eigenmann.

Bryconamericus Eigenmann, Ann. Carnegie Mus., IV, 1907, 139 (*exodon*).

Type, *Bryconamericus exodon* Eigenmann.

This genus is an *Astyanax* with the front rows of teeth of the premaxillary usually in a wavy line, not parallel with the line of the second row, which is com-

posed of but four teeth. D. 9 or 10, rarely 11; second suborbital expanded, covering the entire space between the eye and the lower limb of the preopercle; no naked area below the surface of the first and second suborbitals. Maxillary with not more than five teeth on its upper anterior edge; caudal naked.

A single species has been taken in Guiana.

209. **Bryconamericus hyphessus** Eigenmann. (Plate XLV, fig. 2.)

Bryconamericus hyphesson Eigenmann, Ann. Carnegie Mus., VI, 1909, 32; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 434.

Type, 37.5 mm. Tumatumari, Lower Potaro. (Carnegie Museum Catalog of Fishes No. 1070.)

Cotypes, ten specimens, 34–36 mm. Tumatumari. (C. M. Cat. No. 1071*a–b*; I. U. Cat. No. 11755.)

Most closely related to *stramineus*.

Head 4.5; depth 4; D. 9; A. 16; scales 4–36–2; eye 2.66–2.75; interorbital equal to eye.

Slender, but compressed, greatest depth over tip of pectorals; ventral and dorsal outlines equally arched; preventral area rounded, with normal scales; postventral area short, compressed; predorsal area rounded, with a regular series of ten scales.

Occipital process very short, only about one-eighth of the distance between its base and the dorsal, bordered by two scales on the sides; skull convex, smooth, a groove above the eye just within the orbital rim; frontal fontanel very short, triangular, not half as long as the parietal; snout blunt, the lower jaw included; mouth small, the maxillary a little more than half the length of the eye; cheeks not very wide, entirely covered by the second suborbital; maxillary with three or four broad, five-pointed teeth; premaxillary with two series of five-pointed teeth, four teeth in the inner row, four to six in the outer, the teeth of the outer row smaller than those of the inner row, the inner series parallel with the outer, except that the third tooth is withdrawn from the line of the rest; dentary with seven or eight graduated, five-pointed incisors.

Scales very regularly imbricate, without interpolated or omitted scales; about three scales on the base of each caudal lobe; scales of the sides usually without, those of the tail sometimes with a single ridge or line; anal sheath very narrow, consisting of a single series of minute scales extending along the greater part of the base of the fin; lateral line decurved.

Origin of dorsal a little behind the middle of the body, over the middle of the

ventrals; highest dorsal ray 4.5 in the length; adipose fin behind the vertical from the base of the last anal ray; caudal forked, the longest rays a little greater than the depth; anal slightly emarginate; ventrals reaching anal, pectorals to ventrals, or but a trifle shorter.

Hyaline; a conspicuous silvery lateral band; sides of head silvery; a vertical humeral spot crossing the second scale of the lateral line; three parallel dark lines along the middle of the back; scales of the back margined with several rows of chromatophores; chromatophores along base of anal and scattering ones on the sides, a band of chromatophores below the silvery band; a narrow dark band from the tip of the first (short) dorsal ray to the tip of the penultimate, tips of the longer rays and bases of all the rays hyaline; caudal everywhere punctate, except at the tips of the rays and a triangular patch adjoining the middle rays above and below, these parts hyaline; tips of highest anal rays milky; tips of the other rays dark, the dark color continued across the longest rays at the same level; pectorals and ventrals more or less dotted.

210. Astyanax Baird and Girard.

Astyanax Baird and Girard, Proc. Acad. Nat. Sci. Phila., 1854, 26.

Type, *Astyanax argentatus* Baird and Girard.

Small Tetragonopterids with two series of teeth in the premaxillary, five or more teeth in the inner series; a single series in the mandible, those on the sides being abruptly smaller; a few teeth on the maxillary; lateral line complete, but little decurved; caudal naked, predorsal line scaled; anal short or moderate, its origin behind that of the dorsal; preventral area with normal scales; second suborbital leaving a narrow naked area.

Key to the Guiana Species of Astyanax.

a. Caudal spot minute or none.
  b. A. 25–27; scales 34 or 35. . . . . guianensis.
  bb. A. 20–22; scales 33–35. . . . . essequibensis.
aa. A large caudal spot.
  c. A vertical humeral spot; a definite, oval caudal spot. A. 21–24; lateral line 33–35. . . . . mutator.
  cc. A large, definite, horizontal, parabolic humeral spot; a diffuse caudal spot; A. 25–26; lateral line 34–35; depth 2.3–2.6. . . . . mucronatus.
  ccc. A large, horizontal humeral spot; depth 3. . . . . wappi.

211. Astyanax guianensis Eigenmann. (Plate LI, fig. 1.)

Astyanax guianensis Eigenmann, Ann. Carnegie Mus., VI, 1909, 16; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 434.

Type, 54 mm. Warraputa. (Carnegie Museum Catalog of Fishes No. 1013.)

Cotypes, one hundred and seventy-six specimens. Rockstone. (C. M. Cat. No. 1014*a–z*; I. U. Cat. No. 11717.)

Cotypes, two specimens, 45–52 mm. Crab Falls. (C. M. Cat. No. 1015; I. U. Cat. No. 11718.)

Cotypes, two specimens, 50–55 mm. Warraputa. (C. M. Cat. No. 1016; I. U. Cat. No. 11719.)

Cotypes, thirty-four specimens, 43–55 mm. Tumatumari. (C. M. Cat. No. 1017*a–j*; I. U. Cat. No. 11720.)

Allied to *A. multidens*, but without a caudal spot.

Head 4; depth 2.6–3; D. 10 or 11; A. 25–27; scales 5–34 or 35 (rarely 36)–4; eye 2.33; interorbital 3.

Compressed, subrhomboidal; ventral profile regularly arched; dorsal profile with an angle at the origin of the dorsal, slightly depressed over the eye; preventral area rounded, tending to flattish, with a median series of scales, sometimes irregular in the middle; postventral area narrowly rounded; predorsal area rounded, with a median series of nine scales.

Occipital process about 4 in the distance from its base to the dorsal, bordered by three scales on the sides; interorbital flat, with marginal grooves; frontal fontanel shorter, triangular; second suborbital covering the entire cheek, with the exception of a triangular area below the junction between the first and second suborbitals; maxillary much shorter than the eye, 3 in the head; four or five teeth in the first row of the premaxillary, if five, the third very slightly out of line with the others; five graduated teeth in the second row, their denticles arranged in a slight crescent; four to seven teeth in the maxillary; mandible with four large teeth, and abruptly smaller ones on the sides.

Scales everywhere regularly imbricate, no omitted or interpolated scales; each scale of the side with from two to eight diverging striæ; anal sheath of very few scales in a single series along the base of the anterior rays; a few scales on the base of the caudal lobes.

Ventrals slightly nearer to the snout than to the dorsal; origin of the dorsal in advance of the middle, its highest ray 3.25 in the length; anal deeply emarginate, the second and eleventh rays reaching the base of the eighteenth; ventrals reaching anal, pectorals slightly beyond ventrals.

Opercle dusky; a dark vertical band crossing the third to the sixth scales behind the head; a dusky streak below origin of dorsal; sides behind this profusely dotted; margins of scales of the sides of the abdomen with a few color-cells; very few cells

on the cheeks; base and tip of dorsal hyaline, the middle with chromatophores; adipose dotted; caudal nearly uniformly dotted, a small area at base of each lobe free from chromatophores; anal lobe and a streak through its middle free from pigment; ventrals and pectorals practically free from pigment.

212. Astyanax essequibensis Eigenmann. (Plate LI, fig. 2.)

Astyanax essequibensis Eigenmann, Ann. Carnegie Mus., VI, 1909, 17; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 434.

Type, 53 mm. Tumatumari. (Carnegie Museum Catalog of Fishes No. 1018.)

Cotypes, ninety-six specimens, 40–68 mm. Tumatumari. (C. M. Cat. No. 1019*a–z*; I. U. Cat. No. 11721.)

Cotype, one specimen, 44 mm. Bartica. (C. M. Cat. No. 1020.)

Cotypes, three specimens, 41–48 mm. Rockstone. (C. M. Cat. No. 1021*a*; I. U. Cat. No. 11723.)

Cotypes, seventy-five specimens, 39–57 mm. Crab Falls. (C. M. Cat. No. 1022*a–z*; I. U. Cat. No. 11723.)

Allied to *A. paucidens*, but having a well-developed humeral spot.

Head about 4; depth 3.33; D. 11; A. 20–22; scales 5–33 to 35–4; eye 2.3; interorbital 3.

Elongate, the ventral profile regularly arched; dorsal profile with an angle at the origin of the dorsal, not depressed over the eye; preventral area flat, postventral narrowly rounded; predorsal area rounded, with a median series of eight or nine scales.

Occipital process about one-fifth of the space from its base to the dorsal, bordered by three scales; interorbital nearly flat, with marginal grooves; frontal fontanel narrow, longer than the parietal; second suborbital leaving a triangular naked area below its junction with the first; maxillary 3 in the head; premaxillary with two to four teeth in the front series, which is parallel with the second series; five teeth in the second row, their denticles arranged in a distinct crescent; maxillary with three teeth; mandible with four graduated teeth and abruptly smaller ones on the sides.

Scales as in *A. guianensis*, but fewer scales on the base of the caudal lobe.

Dorsal and ventrals equidistant from tip of snout; highest dorsal ray about 3.75 in the length; origin of dorsal about equidistant from tip of snout and tip of adipose; anal emarginate; ventrals not quite reaching anal; pectorals to ventrals.

Highly iridescent, a few chromatophores on cheek and opercles; an oblique dark band crosses the second, third, and fourth scales of the lateral line, another

one parallel to it in front of the dorsal shades into the thickly punctate sides; a punctate band extends from the base of the first dorsal ray to the tips of the seventh and eighth; tip of adipose black; a minute spot at the base of the middle caudal rays, their tips dusky, all of the membranes punctate; a punctate band from the middle of the first anal rays along the tips of the rest of the rays, other parts of the fin hyaline; pectorals and ventrals slightly punctate.

213. **Astyanax mutator** Eigenmann. (Plate LI, fig. 3.)

"Punkay."

Astyanax mutator EIGENMANN, Ann. Carnegie Mus., VI, 1909, 18; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 434.

Type, 53 mm. Savannah Landing, Upper Potaro. (Carnegie Museum Catalog of Fishes No. 1023.)

Cotypes, one hundred and twenty specimens, 23–58 mm. Savannah Landing, Upper Potaro. (C. M. Cat. No. 1024*a–z*; I. U. Cat. No. 11724.)

Head 4; depth 2.75–3; D. 11; A. 21–24, most frequently 22; scales 6–33 to 35–4.5; eye 2.75–3; interorbital equal to eye.

Compressed; dorsal and ventral profiles equally curved; snout narrow, pointed; profile not depressed over the eye; preventral area rounded, without a distinct median series of scales; postventral area narrowly rounded; predorsal area keeled, with a median series of nine or ten scales.

Occipital process very narrow, about one-fifth as long as the distance of its base from the dorsal, bordered on each side by three scales; interorbital convex; frontal fontanel much shorter than the parietal; second suborbital narrow, leaving a naked area, which is more than half as wide as the bone itself; maxillary equal to snout in length, its front margin very convex; width of lower jaw about half the orbit; premaxillary with two to four teeth in the front series, five five-pointed teeth in the second series; maxillary with three teeth, of which one is minute; dentary with five or six five-pointed teeth, graduate; abruptly a series of minute conical teeth on the sides.

Gill-rakers 11 + 18.

Scales regularly imbricate, no interpolated or omitted series; anal sheath of a single series of scales along anterior part of anal; lateral line little decurved, sometimes broken or interrupted on the tail, each scale with several radiating striæ.

Origin of dorsal midway between tip of snout and base of middle caudal rays; highest dorsal ray nearly 4 in the length; origin of anal and ninth to eleventh dorsal rays equidistant from snout; anal very slightly emarginate; ventrals considerably

in front of the vertical from the first dorsal ray, just reaching anal; pectorals just to ventrals or a trifle shorter.

Dusky; a definitely circumscribed oval caudal spot, not continued forward or backward on the middle caudal rays; a well-defined bar crossing the second and third scales of the lateral line; sides of head and body everywhere profusely dotted; dorsal, caudal, and anal dotted; base of caudal with the outlines of the rays and their cross-breaks outlined in black, making this part of the fin darker.

214. **Astyanax mucronatus** Eigenmann. (Plate LI, fig. 4.)

Astyanax mucronatus Eigenmann, Ann. Carnegie Mus., VI, 1909, 19; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 433.

Type, 53 mm. Tumatumari, above the falls. (Carnegie Museum Catalog of Fishes No. 1025.)

Cotypes, three specimens, 51–54 mm. Tumatumari, above the falls. (C. M. Cat. No. 1026; I. U. Cat. No. 11725.)

Cotypes, fourteen specimens, 46–73 mm. Sand-bank in Potaro at Tukeit. (C. M. Cat. No. 1027*a–e*; I. U. Cat. No. 11726.)

Head 3–6; depth 2.3–2.6; D. 11; A. 25–26, rarely 27; scales 6–34 or 35–5 (rarely 4). Eye 2.7 in the head, 2 in the head without the operele; interorbital 3–3.5 in the head.

Compressed, subrhomboidal, with heavy head and slender caudal peduncle. Dorsal profile slightly depressed over the eye, rising with a gentle curve to the origin of the dorsal, abruptly descending to the end of the dorsal and then with a more gentle slope to the caudal peduncle. Ventral profile more regularly arched. Preventral region broadly rounded; postventral area more narrowly rounded; predorsal area keeled, with a median series of eight scales.

Occipital crest exceptionally narrow at the base; about one-fourth of the distance from its base to the dorsal, bordered by three scales on the sides; skull narrow, slightly convex, smooth. Fontanels very narrow and long, the frontal fontanel as long as the parietal. Second suborbital leaving but a very narrow naked area. Maxillary but little longer than snout, 3.3 in the head. Premaxillary with two or three teeth in the front series, five teeth in the second series, their denticles in a straight line; two teeth on the maxillary; lower jaw with eight teeth arranged in a crescent (four on each side), and smaller teeth on the sides.

Gill-rakers 5 + 10.

Scales very regularly imbricate, without interpolated or omitted rows. Each scale with several slightly diverging striæ; anal sheath of a single row of scales along the base of the anterior rays; caudal naked.

Origin of dorsal nearer to snout than to caudal, 3.4 in the length; anal emarginate, its origin about equidistant from snout with the eighth dorsal ray; ventrals reaching anal, their origin a little in advance of that of the dorsal. Pectorals reaching beyond origin of ventrals.

A conspicuous parabolic humeral spot, the blunt end forward, and a faint dark streak extending below it; a diffuse caudal spot occupying the entire width of the end of the caudal peduncle.

Dorsal line dark; sides profusely covered with pigment cells, disappearing on the belly; cheeks and opercles dotted; fins dotted; upper and lower margin of caudal dark. Straw-colored in life; bases of dorsal, anal, and caudal lobes ochreous.

215. **Astyanax wappi** (Cuvier and Valenciennes). (Plate LII, fig. 1.)

Tetragonopterus wappi Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 153 (Guiana).—Günther, Catalogue, V, 1864, 326 (British Guiana).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 53.—Ulrey, Ann. N. Y. Acad. Sci., VIII, 1895, 278.

Astyanax wappi Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 433.

I have examined the type, No. 2336, Jardin des Plantes, 105 mm. in total length. Head 3.33; depth 3; scales 6–36–5 (type), 7–38–6; eye 1.5 in the very convex interorbital, 1 in snout, 4 in head; A. 27; maxillary with one tooth; predorsal line scaled. Dorsal and anal profile about equally arched; second preorbital striate; a large oval humeral spot, twice as long as high; a dark caudal spot extending forward on the sides; traces of longitudinal streaks between the rows of scales. The figure is based on a specimen in the British Museum.

It is quite possible that both specimens said to have come from Guiana (the one in Paris and the one in London) actually came from the Branco basin, and should therefore be excluded from this account.

Pœciurichthys Gill.

Pœciurichthys Gill, Ann. Lyc. Nat. Hist. N. Y., VI, 1858, 414.

Like *Astyanax*, except that the predorsal line is naked.

Type, *Pœciurichthys brevoortii* Gill.

a. Scales 42–50.

b. Lateral line 42–46; a round spot over the seventh to ninth scale of the lateral line; no caudal spot. **polylepis.**

bb. Lateral line 43–51; a narrow ovate spot over the first five scales of the lateral line; a large caudal spot. **abramoides.**

aa. Scales 41, usually fewer.

d. Anal margin straight; a black stripe on the caudal peduncle, continued on the middle rays. **bimaculatus.**

dd. Anal emarginate, a black band across the base of the caudal..... **potaroënsis.**

216. **Pœcilurichthys polylepis** (Günther). (Plate LII, figs. 2, 3.)

Tetragonopterus maculatus Müller and Troschel, Horæ Ichth., I, 1845, 74, part; in Schomburgk, Reisen, III, 1848, 634, part.

Tetragonopterus polylepis Günther, Catalogue, V, 1864, 320 (British Guiana). —Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 52.—Ulrey, Ann. N. Y. Acad. Sci., VIII, 1895, 276.

Pœcilurichthys polylepis Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 433.

One specimen, 44 mm. Wismar. (C. M. Cat. No. 1416*a*.)

Nineteen specimens, 35–53 mm. Rockstone. (C. M. Cat. No. 1418*a–d*; I. U. Cat. No. 11789.)

Ten specimens, 38–52 mm. Gluck Island. (C. M. Cat. No. 1417*a–c*; I. U. Cat. No. 11790.)

Ten specimens, 49–85 mm. Crab Falls. (C. M. Cat. No. 1415*a–c*; I. U. Cat. No. 11791.)

Sixty-nine specimens, 50–85 mm. Tumatumari. (C. M. Cat. No. 1419*a–j*; I. U. Cat. No. 11792.)

Readily distinguished by its circular spot over the seventh to ninth scales of the lateral line, and by its small scales.

Head 3.5–4; depth 2 in the largest to 2.5 in the young; D. 11; A. 27–31[47]; scales 10–42 to 46[48]–7 to 9 to ventrals; eye 3; interorbital 2.3.

Much compressed, very deep in the old, the ventral profile pendant; dorsal profile regularly arched from the snout to the caudal peduncle; much slenderer in the young, but maintaining the same ratio of curvature between back and belly. Preventral region narrowly rounded, the pectorals considerably above the lower edge of the breast; scales of belly irregularly imbricate; postventral area narrowly compressed; entire back very narrow, not especially keeled. Predorsal area naked to near the dorsal, where there are a few median scales or a few of the scales of one side overlapping the back.

Occipital process one-fourth of the distance from its base to the dorsal, bordered on the sides by five scales; skull smooth, very convex; frontal fontanel shorter

[47] Günther gives the anal as 34 in the type. In twenty specimens examined two have 27 rays, four have 28, eight have 29, four have 30 and two have 31.

[48] In sixteen six have 42, six have 43, two have 44, one has 45 and one 46.

than the parietal, extending to above the anterior margin of the pupil; margin of second suborbital very convex, leaving but a narrow naked margin; maxillary 2.66 in the head, the mouth large. Four to six teeth in the front row of the premaxillary, the third withdrawn from the line of the rest; five teeth in the second series, their denticles in a straight line; eight large teeth in the lower jaw (four on each side) arranged in a crescent; small teeth on the side.

Scales of the sides and back regularly imbricated; a few interpolated scales over the anal muscles; a row of about twelve scales forming a sheath along the base of the anterior rays. Scales of belly and breast not very regularly arranged; lateral line but little decurved; axillary scale well-developed.

Dorsal equidistant with the ventrals from the snout, its origin a little in advance of the middle, its highest ray 3.5 in the length; anal emarginate; ventrals not reaching anal; pectorals slightly beyond origin of ventrals.

Highly iridescent; a round spot over the seventh to the ninth scale of the lateral line, with a dark streak extending down from it and another curving upward and forward, surrounded by a lighter area; sides and fins thickly punctate, especially in a lateral band on a level with the humeral spot. Tip of first anal ray sometimes milk-white.

217. Pœcilurichthys abramoides (Eigenmann). (Plate LII, fig. 4.)

Tetragonopterus abramis (not of Jenyns) Günther, Catalogue, V, 1864, 321 (British Guiana; Essequibo).—Steindachner, "Flussfische Südamerika's," i, 1879, 8 (Orinoco near Ciudad Bolivar).

Astyanax abramoides Eigenmann, Ann. Carnegie Mus., VI, 1909, 21; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 432.

Type, 112 mm. Tumatumari. (Carnegie Museum Catalog of Fishes No. 1028.)

Cotypes, eighty-six specimens, 48–112 mm. Tumatumari. (C. M. Cat. No. 1029*a–j*; I. U. Cat. No. 11727.)

Cotypes, two specimens, 99–126 mm. Potaro Landing. (C. M. Cat. No. 1030; I. U. Cat. No. 11728.)

Cotypes, twenty-seven specimens, 60–126 mm. Kangaruma. (C. M. Cat. No. 1031*a–c*; I. U. Cat. No. 11729.)

Cotypes, forty-eight specimens, 56–108 mm. Amatuk Cataract. (C. M. Cat. No. 1032*a–j*; I. U. Cat. No. 11730.)

Cotype, one specimen, 54 mm. Rockstone. (C. M. Cat. No. 1033.)

Cotype, one specimen, 46 mm. Gluck Island. (C. M. Cat. No. 1034.)

Cotypes, two specimens, 56–63 mm. Wismar. (C. M. Cat. No. 1035; I. U. Cat. No. 11731.)

Cotypes, two specimens, 51–64 mm. Christianburg. (C. M. Cat. No. 1036; I. U. Cat. No. 11732.)

Closely allied to *P. anterior* and *P. abramis*, but differing from both in the color of the caudal peduncle and caudal.

Head 4; depth 2.4–2.5; D. 11; A. usually 28;[49] scales 9 or 10–43 to 51[50]–7 or 8; eye 2.5–3; interorbital 2.5–2.6.

Elliptical; dorsal and ventral outlines similar, without prominent humps, the profile slightly depressed over the eyes. Preventral area rounded, with small, rather irregularly placed scales; postventral area narrowly rounded; predorsal area narrow, with a linear median naked area.

Occipital process equal to one-fourth of the distance from its base to the dorsal, bordered by four scales on its sides; skull smooth in cross-section, very convex; interorbital much broader than the eye in adult; frontal fontanel a little narrower than the parietal; margin of second suborbital very convex, leaving a naked area, which is widest below; maxillary equal to the eye; four or five teeth in the front row of the premaxillary, the third withdrawn from the line of the rest; five graduated teeth in the second row, their denticles in shallow crescents: maxillary with two or three minute teeth; dentary with four large teeth, abruptly followed by smaller ones on the sides.

Gill-rakers 8 + 11.

Scales of the sides regularly imbricated; a few interpolated scales over the anal muscles; anal sheath of a single row of scales along the base of the anterior rays; caudal naked; a well-developed axillary scale; lateral line but little decurved. Each scale of the sides with a few nearly parallel striæ.

Dorsal but little farther from snout than the ventral, nearer to snout than to caudal, its margin rounded, the highest ray about 3.75 in the length, the penultimate a little less than half as long as the highest. Anal emarginate, the second and tenth reaching the base of the eighteenth when depressed; first anal ray below or behind the base of the last dorsal ray. Ventrals not reaching anal, pectorals to ventrals.

Highly iridescent, blue above, greenish to silvery below; a club-shaped horizontal humeral spot, its pointed anterior end from the upper margin of the first scale of the lateral line along the row of scales above the latter to above the

[49] In those examined, one with 26, ten with 28, five with 29, three with 30.

[50] In those examined, one with 43, four with 44, two with 45, four with 46, four with 47, one with 51.

fifth scale of the line; a dark vertical bar crossing the opercle, followed by a light bar, a second dark bar across the posterior part of the humeral spot, a second light bar and then a third dark bar, shading into the profusely dotted sides. Cheeks profusely dotted; a dark median line, most prominent in young specimens preserved in formalin, this line *not extending* along the sides of the caudal peduncle; a black spot at the base of the caudal, its margins shading into the dusky caudal, but not definitely continued to the end of the middle rays. These markings fade with age. In life all fins but the pectorals are tinged with orange or brick-red.

218. Pœcilurichthys bimaculatus (Linnæus).

"Charax" No. 54, Gronow, Mus. Ichth., I, 1754, 19, pl. 1, fig. 5.

Albula maculata Linnæus, Mus. Adolphi Fred., 1754, 78, pl. 32, fig. 2.

Tetragonopterus maculatus Müller and Troschel, Horæ Ichth., I, 1845, 14, part, pl. 3, fig. 4; in Schomburgk, Reisen, III, 1848, 634, part (Rupununi; Essequibo). —Günther, Catalogue, V, 1864, 321 (Demerara; River Capin; Pernambuco). —Steindachner, "Süsswasserfische d. Südöstlichen Brasilien," iii, 1876, 568, pl. 1, fig. 2 (Rio Parahyba; Rio Doce; Rio Mucuri).—Peters, MB. Akad. Wiss. Berlin, 1877, 472 (Calabozo).—Boulenger, Ann. and Mag. Nat. Hist., XIX, 1887, 173 (Rio Grande do Sul).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 52.—Ulrey, Ann. N. Y. Acad. Sci., VIII, 1895, 275.—Perugia, Ann. Mus. Genova, (2*a*), X, 1891, 43 (Rio Paraguay; Asuncion; Villa Maria).—Boulenger, Boll. Mus. Zool. ed. Anat. Comp. Torino, X, 1895, 3 (Colonia Risso).—Pellegrin, Bull. Mus. d'Hist. Nat., V, 1899, 157 (Apuré).—Regan, Proc. Zool. Soc. London, 1906, 384 (Trinidad).

Salmo bimaculatus Linnæus, Syst. Nat., ed. 10, 1758, 311, No. 20; ed. 12, 1766, 513 (South America).—Bloch, Ausl. Fische, 1794, pl. 382, fig. 2.—Bloch and Schneider, Syst. Ichth., 1801, 413.

Charax bimaculatus Gronow, Cat. Fish, ed. Gray, 1854, 154.

Astyanax bimaculatus Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 432 (headwaters of the Tocantins).—Eigenmann and Ogle, Proc. U. S. Nat. Mus., XXXIII, 1907, 27, part (Pará; British Guiana).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 432.

Tetragonopterus linnæi Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 142 (Cayenne).

Tetragonopterus gronovii Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 143 (Surinam).—Kner, "Familie der Characinen," i, 1859, 39.—Kner and Steindachner, Abhand. K. Bayer. Akad. Wiss., II Kl., X, 1864, 46 (Rio Bayano).

Tetragonopterus orbignianus Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1849, 147 (Buenos Aires).

Pœciluriehthys brevoortii Gill, Ann. Lyc. Nat. Hist. N. Y., VI, 1858, 417 (Trinidad).—Günther, Catalogue, V, 1864, 317.

Tetragonopterus brevoortii Lütken, Vidensk. Med. Nat. For. Kjöbenhavn, 1874, 232.—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 53.—Ulrey, Ann. N. Y. Acad. Sci., VIII, 1895, 275.

Tetragonopterus bartletti Günther, Ann. and Mag. Nat. Hist., (3), XVIII, 1866, 30 (upper Amazon).—Cope, Proc. Acad. Nat. Sci. Phila., 1871, 260 (Ambyiacu).

Astyanax bartlettii Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 343, fig. 31 (Ambyiacu).

Tetragonopterus orientalis Cope, Proc. Am. Philos. Soc., XI, 1870, 559 (Pará).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 279.—Ulrey, Ann. N. Y. Acad. Sci., VIII, 1895, 279.

Astyanax orientalis Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 434, fig. 35.

Astyanax microstoma Hensel (not of Günther), Archiv für Naturg., 1870, 83.

Tetragonopterus lacustris (not of Lütken) Boulenger, Trans. Zool. Soc. London, XIV, 1896, 35 (Descalvados and North Paraguay).—Eigenmann and Norris, Rev. Mus. Paulista, IV, 1900, 357 (Piracicaba).

Astyanax lacustris Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 433 (Pará, Peruvian Amazon).

Tetragonopterus maculatus lacustris Eigenmann, Ann. N. Y. Acad. Sci., VII, 1894, 633 (Rio Grande do Sul).—Ulrey, Ann. N. Y. Acad. Sci., VIII, 1895, 275.—Eigenmann and Kennedy, Proc. Acad. Nat. Sci. Phila., 1903, 521 (Asuncion; Estancia la Armonia; Arroyo Trementina).—Eigenmann and Ward, MS. (Corumbá; Bahia Negra; Porto Max; Sapucay).

Tetragonopterus caudimaculatus Cope, Proc. Am. Philos. Soc., XXXIII, 1894, 107 (headwaters of Tocantins).

? *Tetragonopterus jacuhiensis* Cope, Proc. Am. Philos. Soc., XXXIII, 1894, 88 (Rio Grande do Sul).—Ulrey, Ann. N. Y. Acad. Sci., VIII, 1895, 280.—Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 435 (Jacuhy).

One specimen, 102 mm.[51] Maripieru, branch of the Ireng. (C. M. Cat. No. 1354*a*.)

Five specimens, 87–133 mm. Holmia. (C. M. Cat. No. 1355*a–b*; I. U. Cat. No. 11847.)

[51] This specimen has but twenty-seven anal rays, and scales 7–37–6.

One hundred and two specimens, 37–142 mm. Georgetown trenches. (C. M. Cat. No. 1356*a–z*; I. U. Cat. No. 11848.)

One hundred and twenty-two specimens, 51–126 mm. Botanic Garden. (C. M. Cat. No. 1357*a–z*; I. U. Cat. No. 11849.)

Seven specimens, 74–85 mm. Lama Stop-Off. (C. M. Cat. No. 1358*a–b*; I. U. Cat. No. 11850.)

One specimen, 79 mm. Maduni Creek. (C. M. Cat. No. 1359*a*.)

Two specimens, 83–84 mm. Mora Passage. (C. M. Cat. No. 1360*a*; I. U. Cat. No. 11851.)

Head 3.5–4.3; depth 2–2.6; D. 11; A. 28–36, most frequently 32; scales 7–37 to 41–6; eye about 3 in the head; interorbital 2.3–2.4.

Elliptical; predorsal area narrowly rounded, with a few median scales near the dorsal. Occipital process one-third to one-fourth in the distance between its base and the dorsal; second suborbital leaving a narrow naked area.

Anal slightly emarginate in the young, straight in the adult.

A well-defined, horizontally ovate, black humeral spot over the third to the sixth, or second to the fifth scale of the lateral line; a spot on the caudal peduncle, fading out forward and continued behind to the tip of the middle caudal rays.

219. **Pœcilurichthys potaroënsis** (Eigenmann). (Plate LII, fig. 5.)

Astyanax potaroënsis Eigenmann, Ann. Carnegie Mus., VI, 1909, 22; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 433.

Type, 58 mm. Amatuk. (Carnegie Museum Catalog of Fishes No. 1037.)

Cotypes, twelve specimens, 51–64 mm. Amatuk. (C. M. Cat. No. 1038*a–c*; I. U. Cat. No. 11733.)

Cotype, one specimen, about 59 mm. Kangaruma. (C. M. Cat. No. 1039.)

Cotype, one specimen, 45 mm. Tukeit. (C. M. Cat. No. 1040.)

Cotypes, two specimens, 47–49 mm. Erukin. (C. M. Cat. No. 1041; I. U. Cat. No. 11734.)

Evidently allied to *P. bimaculatus* and *P. orthodus*. It is readily distinguished from the former by the emarginate anal, the broad caudal band, and the absence of any stripe on the caudal peduncle. In the coloration of the sides it approaches *P. abramoides*, the humeral spot being less defined, the black lateral line being absent. Its anal is distinctly shorter than that of *orthodus*.

Head 3.5; depth 2.6–3; D. 11; A. 27 or 28, rarely 29; scales 8 (rarely 9)–37 to 38[52]–6 or 7; eye 2.75; interorbital 3.

[52] In ten individuals five have 37, three have 38, one has 39, and one 41 scales.

Elongate, subrhomboidal, profile rising rapidly in front, then curved more gently to the dorsal; ventral profile regularly rounded. Preventral area convex, without a distinct median series of scales; postventral area narrowly rounded; predorsal area narrowly rounded, two scales in front of the dorsal, the median line otherwise naked to the occipital process.

Occipital process very narrow, its width not quite half its length, which is about one-fifth as long as the distance from its base to the dorsal, bordered by three scales on the sides. Interorbital smooth and convex; frontal fontanel a little narrower and a little shorter than the parietal; second suborbital leaving a considerable naked area, which is widest below; mouth large, maxillary a little longer than the eye; normally four teeth in the outer series of the premaxillary, of which the third is withdrawn from the line of the rest; five teeth in the second series; maxillary with three small teeth; mandible with four large teeth in the dentary and abruptly minute ones on the side.

Gill-rakers 6 + 14, those of the upper arch excessively minute, those of the lower arch about one-third the length of the eye.

Scales of the sides regularly imbricate, no interpolated scales over the anal; scales of the ventral surface less regularly imbricate; lateral line but little decurved; anal sheath composed of a single series of scales along the base of the anterior rays.

Ventrals but little nearer the snout than to the dorsal, which is a little nearer to the snout than to the caudal; highest dorsal ray about 4 in the length. Anal emarginate, the second and fourteenth rays reaching the base of the twentieth ray. Ventrals not reaching anal, pectorals just to ventrals.

Coloration much as in *abramoides*. A dark bar crossing operele, a second bar some distance behind this in a light area, the second bar widest above the lateral line, where it forms an indistinct humeral spot; a third bar shading into the thickly dotted sides; cheeks thickly punctate; a dark dorsal streak. A black band crossing the base of the caudal and sometimes extending out along the outer rays. No dark line along the sides in formalin specimens, but sometimes dark streaks up and down from the median line between the muscle segments.

Ctenobrycon Eigenmann.

Ctenobryeon Eigenmann, Bull. Mus. Comp. Zool., XLI, 1908, 94.

Type, *Tetragonopterus hauxwellianus* Cope.

Distinguished from all other Tetragonopterids by its ctenoid scales.

Anal long, its margin nearly straight, its origin behind or below the origin of the dorsal; mouth very small, the maxillary not reaching the eye; scales of the

breast ctenoid, those of the sides cycloid in young, becoming ctenoid in adult; lateral line always complete, a long tube extending on the middle caudal membrane; caudal naked; maxillary with none or two teeth; a series of tricuspid teeth in the premaxillary and an inner series of five-pointed ones, the denticles of which are arranged in a U-shaped curve; predorsal area scaled.

Premaxillary teeth in parallel series, the third tooth of the first series not being out of line with the rest.

One species is found in the Guianas.

220. **Ctenobrycon spilurus** (Cuvier and Valenciennes). (Plate XLVII, fig. 1.)

Tetragonopterus spilurus Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 156 (Surinam).—Günther, Catalogue, V, 1864, 318.—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 52.—Ulrey, Ann. N. Y. Acad. Sci., VIII, 1895, 274.

Ctenobryeon spilurus Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 435.

Several hundred specimens, the largest 77 mm., from the trenches of Georgetown and the Botanic Garden. (C. M. Cat. No. 1425 and 1426.)

Head 4.25–4.5; depth 2.25–3; D. 11; A. usually 41–45[53]; scales 11 or 12–41 to 50–7 to 10; eye 2.75–3.

Deuterodon Eigenmann.

Deuterodon Eigenmann, Ann. Carnegie Mus., IV, 1907, 140, pl. 41, fig. 3 (*iguape*).
Joinvillia Steindachner, Wien Anz. Akad. Wiss., XIV, 1908, 30 (*rosa*).

Type *Deuterodon iguape* Eigenmann.

Compressed, elliptical fishes of small size,[54] most nearly related to *Astyanax*, from which they differ in dentition. Teeth all multicuspid incisors, those in the premaxillary in two series, those in the maxillary (2–7) and in the mandible in a single series, the latter graduate; lateral line complete; caudal naked. Lives largely in cataracts.

Key to the Guiana Species of Deuterodon.

a. Each pore of the lateral line surrounded by black.....potaroënsis.
aa. A black median band or line, usually with pinnately diverging lines.....pinnatus.

221. **Deuterodon potaroënsis** Eigenmann. (Plate LIII, fig. 1.)

Deuterodon potaroënsis Eigenmann, Ann. Carnegie Mus., VI, 1909, 27; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 431.

[53] Of those examined one has 36, one has 39, one has 40, three have 41, seven have 42, four have 43, four have 44, three have 45, one has 46, and one has 47 anal rays.

[54] The greatest recorded length is about 13 cm. over all.

Type, 43 mm. Amatuk. (Carnegie Museum Catalog of Fishes No. 1053).

Cotypes, five specimens, 39–50 mm. Amatuk. (C. M. Cat. No. 1054; I. U. Cat. No. 11744.)

Cotypes, three specimens, 31–35 mm. Waratuk. (C. M. Cat. No. 1055; I. U. Cat. No. 11745.)

Two specimens, 35–43 mm. Erukin. (C. M. Cat. No. 2455*a–b*.)

This species was taken by using poison in a little side branch of the Waratuk Cataract, and in the same way in a larger branch of the Amatuk Cataract.

Head 3.8–4; depth 3.2–3.5; D. 9 or 10; A. 24 or 25 (rarely 27); scales 6–37 to 40–4. Eye 2.5; interorbital equal to eye.

Elongate, little compressed, heavy at shoulder; dorsal and ventral profiles equally arched, without hump or depressions; preventral area narrowly rounded, with a median series of scales; postventral area compressed to a narrow edge; predorsal area keeled, with a median series of about thirteen scales.

Occipital process about one-fifth of the distance from its base to the dorsal, bordered by three scales; head narrow, smooth above, slightly convex; frontal fontanel much shorter than the parietal, narrow; second suborbital leaving a naked area about one-third as wide as its own greatest width; maxillary longer than snout, but not quite equal to eye; premaxillary with three three-pointed teeth in the front row and five three- to five-pointed ones in the second; denticles of the second row in a more or less open crescent; four or five maxillary teeth similar to those of the inner row of the premaxillary. Mandible with seven graduated multicuspid incisors, followed by one or two conical incisors.

Gill-rakers 6 + 12.

Origin of dorsal a little nearer snout than to caudal, its penultimate ray a little more than half as long as the longest ray, which is about one-fourth of the length. Margin of anal straight, the rays graduate from the anterior longer ones; ventrals very short, not reaching anal, a little nearer to the snout than the dorsal; pectorals reaching ventrals.

Markings in formalin specimens: each pore of the lateral line surrounded by black, the dots forming a conspicuous line; bases of two rows of scales below the lateral line over the abdomen and three or four rows of scales above the lateral line dark, the spots forming fainter longitudinal lines; margins of scales of the upper parts of the sides and the entire dorsal line very dark; a faint comma-shaped vertical humeral spot interrupted in the middle; a dark lateral band intensified in spots and ending in a caudal spot, which extends from a little above the lateral line to the lower margin of the caudal; ventral fins dusky.

222. **Deuterodon pinnatus** Eigenmann. (Plate LIII, fig. 2.)

Deuterodon pinnatus EIGENMANN, Ann. Carnegie Mus., VI, 1909, 26; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 431.

Type, 62 mm. Amatuk. (Carnegie Museum Catalog of Fishes No. 1046.)

Cotypes, twenty-five specimens, 32–75 mm. Amatuk. (C. M. Cat. No. 1047*a–e*; I. U. Cat. No. 11738.)

Cotypes, two specimens, 36–40 mm. Konawaruk. (C. M. Cat. No. 1048; I. U. Cat. No. 11739.)

Cotypes, nineteen specimens, 21–43 mm. Warraputa. (C. M. Cat. No. 1049*a–c*; I. U. Cat. No. 11740.)

Distinguished from all other Tetragonopterids by the pinnate black markings of the sides.

Head 4–4.3; depth 2.5–2.7; D. 10 or 11; A. 24–25, rarely 27; scales 6–36 or 37–4 or 5.

Compressed, subrhomboidal; profile slightly depressed over the eye; preventral area rounded; the scales large, a nearly regular median series; postventral area narrowly rounded, the anus directly in front of the anal; predorsal area narrowly rounded, with a median series of about nine scales.

Occipital process triangular, not quite one-fourth of the distance from its base to the dorsal, bordered by three scales; interorbital convex; fontanels narrow, the anterior shorter than the parietal; second suborbital deep, leaving a wide naked area; maxillary about 3.5 in the head; three or four teeth in the outer row of the premaxillary; five graduated teeth in the inner series, expanded at top, the denticles in a crescent, the middle one not notably larger or longer than the others; three or four similar teeth in the maxillary; dentary with eight to ten graduated teeth, similar to those of the premaxillary, but with longer median point; all the teeth brown-tipped.

Gill-rakers short, 6 + 10.

Ventrals in advance of the vertical from the dorsal; origin of dorsal in the middle or slightly in advance of the middle, its highest ray 3.75 in the length; twelfth anal ray two-fifths to about half as high as the highest, the anal margin concave or not; pectorals reaching slightly beyond origin of ventrals, ventrals not quite to anal.

Cheeks and opercles punctate; a well-developed humeral spot in a vertical humeral band; a second band in front of the dorsal, shading into the much punctate sides; a black median line, from which black streaks branch along the septa of the muscles at every other myotome; a conspicuous, large caudal spot, not continued

to the end of the middle rays. Dorsal, adipose, caudal, and anal punctate, the latter sometimes most so along the base and tip.

There are also in the collection:

Cotypes, forty-one specimens, 21–68 mm. Amatuk. (C. M. Cat. No. 1050*a–j*; I. U. Cat. No. 11741.)

Cotypes, seven specimens, 20–69 mm. Waratuk. (C. M. Cat. No. 1051*a–b*; I. U. Cat. No. 11742.)

Cotypes, three specimens, 23–40 mm. Savannah Landing. (C. M. Cat. No. 1052; I. U. Cat. No. 11743.)

These differ from the typical specimens described in that the color along the sides is in a dark band, instead of pinnately distributed, continued to the caudal spot, which is continued to the end of the middle caudal rays. A. 23–25. Lateral line 37, 37, 38, 38, 39, 40 in the six largest specimens from Amatuk.

Phenacogaster Eigenmann.

Phenacogaster Eigenmann, Am. Nat., XLI, 1907, 769.

Origin of anal under origin of dorsal; lateral line complete; scales in front of the ventrals in two series, overlapping in the middle.

Type, *Phenacogaster pectinatus* (Cope).

Range: Amazons and Guiana.

Key to the Guiana Species of Phenacogaster.

a. Lateral spot large, subcircular; a scale in the angle of each pair of the ventral series of scales, except the two pairs between the pectorals; scales with numerous radial striæ; A. 33–37; scales 6–33 to 36–4 or 5; premaxillary with four to seven teeth in the outer series and five to seven three-lobed teeth and one to three conical teeth. A caudal spot, not continued to the end of the middle rays. . . . . **megalostictus.**

aa. Lateral spot minute, inconspicuous; few if any scales in the angles of the pairs of scales along the ventral surface; base and margin of anal dotted, the middle hyaline; scales with concentric striæ; radial striæ inconspicuous or absent. A. 37–40; scales 6–38 or 39–5; premaxillary with four tricuspid and five conical teeth in the inner series; no caudal spot. . . . . **microstictus.**

223. **Phenacogaster megalostictus** Eigenmann. (Plate LIII, fig. 3.)

Phenacogaster megalostictus Eigenmann, Ann. Carnegie Mus., IV, 1909, 28; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 431.

Type, 65 mm. Tumatumari. (Carnegie Museum Catalog of Fishes No. 1056.)

Cotypes, fifty-nine specimens, 42–77 mm. Tumatumari, Lower Potaro River. (C. M. Cat. No. 1057*a–j*; I. U. Cat. No. 11746.)

Cotype, one specimen, 55 mm. Tukeit. (C. M. Cat. No. 1058.)

Cotypes, five specimens, 46–64 mm. Sand-bank at Tukeit. (C. M. Cat. No. 1059; I. U. Cat. No. 11747.)

Cotypes, four specimens, 68–85 mm. Amatuk. (C. M. Cat. No. 1060; I. U. Cat. No. 11748.)

Cotypes, sixteen specimens, 41–64 mm. Crab Falls. (C. M. Cat. No. 1061*a–e*; I. U. Cat. No. 11749.)

Cotypes, eighteen specimens, 36–64 mm. Rockstone. (C. M. Cat. No. 1062*a–e*; I. U. Cat. No. 11750.)

Head 3.8–4; depth about 2.66; D. 11; A. 33–37, usually 35 or 36;[55] scales 6–33 to 36[56]–4 to 5; eye 2.33–2.66; interorbital 3.5–4.

Elongate rhomboidal, heavy forward, the tail much compressed; profile compressed over the eye, arched in front of the dorsal; preventral area flat, with two series of large scales overlapping along the middle, a small scale in the angle of each pair of the overlapping scales, except the two pairs between the pectorals; midline of postventral area naked; predorsal area bluntly keeled, with about ten median scales.

Occipital process one-fourth or one-fifth of the distance from its base to the dorsal, bordered by four scales on the sides; interorbital flat, the upper margin of the eye on a level with the middle of interorbital; frontal fontanel as long as the parietal, narrower than the latter, reaching to above the anterior margin of the pupil; second suborbital corrugate, leaving a wide naked margin; premaxillary-maxillary border without a distinct angle, moderately oblique; a maxillary of nearly equal width throughout, not slipping under or over the first suborbital; snout blunt, the lower jaw included.

Mandible with four to six narrow graduated teeth, with a large central and a minute lateral cusp on each side; sides of mandible with about ten minute teeth; premaxillary with four to seven teeth in a line parallel with the second row, which consists of about five to seven three-lobed and one to three conical teeth; maxillary with eleven to sixteen conical or three-lobed teeth along about half the length of the maxillary.

Gill-rakers 4 + 9.

Scales everywhere regularly imbricate, without interpolate scales, each scale with several radiating striæ; lateral line slightly decurved; anal sheath of a single series of graduate scales along the base of the first rays; caudal naked; axillary scale small.

[55] Of those examined three with 33, four with 34, six with 35, seven with 36 and two with 37.

[56] Of those examined two with 33, three with 34, eight with 35, ten with 36.

Origin of the dorsal a little in advance of the middle, pointed, the rays very rapidly decreasing from the highest, which is equal to about a third of the length.

Anal emarginate, its origin and the third dorsal ray about equidistant from the snout; ventrals extending slightly beyond origin of anal; pectorals beyond base of ventrals.

Straw-colored, with a silvery lateral band, slightly iridescent. A large, conspicuous, subcircular spot over the sixth to eighth scale of the lateral line, occupying the width of two scales (this spot frequently with a lunate encroachment in front); upper part of opercle and area below eye spotted, sometimes the rest of the cheek also spotted; a black median line more or less evident; a large caudal spot extending to near the middle (sometimes farther) of the median caudal rays; scales of the back always broadly margined with black, those of the flanks less so; above the anal the markings of the margin of the scales mixed with the lines of chromatophores following the muscle segments; tips of caudal nigrescent; anal nearly uniformly dotted, or the base and tip dotted, the rest hyaline; first anal rays milk-white.

224. **Phenacogaster microstictus** Eigenmann. (Plate LIII, fig. 4.)

Phenacogaster microstictus Eigenmann, Ann. Carnegie Mus., VI, 1909, 30; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 431.

Type, 48 mm. Tumatumari, Lower Potaro. (Carnegie Museum Catalog of Fishes No. 1063.)

Cotypes, seven specimens, 28 mm. Konawaruk. (C. M. Cat. No. 1064*a–c*; I. U. Cat. No. 11751.)

Cotype, one specimen, 29 mm. Rockstone. (C. M. Cat. No. 1065.)

Cotypes, four specimens, about 35 to about 46 mm. Crab Falls. (C. M. Cat. No. 1066; I. U. Cat. No. 11752.)

Head 4; depth 2.8; D. 11; A. 37–40, generally 39; scales 6–38 or 39–5; eye 2.5; interorbital 3.5.

Only one or two small scales in the angles of the overlapping scales of the ventral surface; interorbital slightly convex. Maxillary teeth about seventeen, scattered along most of its length; premaxillary with four tricuspid and five conical teeth in the inner series; two or three teeth similar to the larger ones, and possibly sometimes a few conical teeth in the outer series; mandible with seven larger and a number of minute teeth.

Scales with concentric striæ, but with very few, or inconspicuous, radial striæ.

Straw-colored; a very faint and small humeral spot over the seventh scale

of the lateral line; a dark deep-lying line; two small deep-lying black spots at the bases of the caudal lobes; no caudal spot; caudal, except the middle of the base of the lobes, dusky; base and margin of anal dotted, the middle hyaline; sides of head and body profusely dotted, the dots on the flanks and back margining the scales, the margin consisting of a single row of chromatophores on the flank, of several rows on the back; dots over the anal muscles following the intermuscular septa. Cotypes all very much lighter.

In one of the Crab Fall specimens the humeral spot is conspicuous, owing to the expansion of the chromatophores.

Holobrycon Eigenmann.

Holobrycon Eigenmann, Ann. Carnegie Mus., VI, 1909, 33.

Type, *Brycon pesu* Müller and Troschel.

Lower jaw with two series of teeth, those of the outer series lobed, those of the inner series conical. Inner series consisting of a pair of conical teeth near the symphysis and a series of much smaller teeth on the posterior part of the sides of lower jaw; upper jaw with three or more series of teeth. No fontanels in half-grown or adult specimens.

225. **Holobrycon pesu** (Müller and Troschel). (Plate LIV, fig. 1.)

"Pesu."

Brycon pesu Müller and Troschel, Horæ Ichth., I, 1845, 30, pl. 7, fig. 1; in Schomburgk, Reisen, III, 1848, 635 (Lower Essequibo and Mazaruni).—Günther, Catalogue, V, 1864, 336.—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 55.

Holobrycon pesu Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 431.

I have examined the type in Berlin and:

One specimen, 80 mm. Warraputa Cataract. (C. M. Cat. No. 1809.)

Two specimens, 102–116 mm. Crab Falls. (C. M. Cat. No. 1810; I. U. Cat. No. 12106.)

One specimen, 84 mm. Gluck Island. (C. M. Cat. No. 1811.)

Seven specimens, 78–100 mm. Rockstone. (C. M. Cat. No. 1812*a–b*; I. U. Cat. No. 12103.)

Eighteen specimens, 29–109 mm. Bartica. (C. M. Cat. No. 1813*a–d*; I. U. Cat. No. 12104.)

One specimen, 61 mm. Wismar. (C. M. Cat. No. 1814*a*.)

Twenty-one specimens, 102–149 mm. Tumatumari. (C. M. Cat. No. 1815*a–e*; I. U. Cat. No. 12105.)

Head 4–4.2; depth 3.25–3.33; D. 11; A. 21–23; scales 8.5–41 to 44–3.5. Eye 3.4–3.75 (3 in the smallest).

Compressed, ventral profile more strongly arched than the dorsal; head pointed; area between ventrals narrowly rounded.

Fontanels becoming closed when specimens reach a size of about 75 mm. Second suborbital covering the entire cheek in the adult; maxillary with teeth along its entire margin, slipping under, but not concealed by the preorbital; snout projecting; premaxillary with eight to ten teeth in the outer row; four large teeth in the outer row of each side of the lower jaw, and smaller teeth on the sides.

Origin of dorsal about equidistant from base of middle caudal rays and anterior margin of the eye; margin of dorsal rounded; adipose fin large; caudal forked, the lobes not twice as long as the middle rays, the middle rays not prolonged.

Anal slightly emarginate; ventrals not reaching anal; pectorals barely reaching ventrals.

Iridescent blue with faint dark cross-lines; a dusky humeral spot; adipose and margin of caudal dusky or black, the caudal sometimes watered. Dorsal, ventrals, middle of anal lobe, and a band on each caudal lobe, rusty.

Subfamily Bryconinæ.

Brycon Müller and Troschel.

Brycon Müller and Troschel, Horæ Ichth., I, 1845, 15 (*falcatus*).
Chalcinopsis Kner, SB. Akad. Wiss. München, 1863, 226 (*striatulus*).
Megalobrycon Günther, Proc. Zool. Soc. London, 1869, 423, fig. 1 (*cephalus*).
Bryconodon Eigenmann, Smiths. Misc. Coll., Quarterly Issue, XLV, 1904, 146 (*orthotænia*).
Triurobrycon Eigenmann, Ann. Carnegie Mus., VI, 1909, 33 (*lundii*).

Type, *Brycon falcatus* Müller and Troschel.

With the characters of *Holobrycon*, but the skull with two large fontanels.

Two species of this genus have been recorded from British Guiana. They may be distinguished as follows:

Key to the Guiana Species of Brycon.

a. Middle caudal rays prolonged, forming a projecting point; base of anal and a large V-shaped caudal spot black; dark lines along the rows of scales ..... **falcatus.**

aa. Middle caudal rays prolonged, the caudal emarginate; fins largely black; dark lines between the rows of scales ..... **siebenthalæ.**

226. **Brycon falcatus** Müller and Troschel. (Plate LIV, fig. 2.)

? *Chalceus labrosus* Schomburgk, Fishes Brit. Guiana, I, 1841, 212 (Paduiri).

Brycon falcatus Müller and Troschel, Horæ Ichth., I, 1845, 29, pl. 6, fig. 1; in Schomburgk, Reisen, III, 1848, 635 (all rivers).—Günther, Catalogue, V, 1864, 334 (Essequibo; Surinam).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 55.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 431.

Brycon schomburgkii Müller and Troschel, Horæ Ichth., I, 1845, 29, pl. 6, fig. 2 (Essequibo); in Schomburgk, Reisen, III, 1848, 96 (Lower Essequibo).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 55.

One specimen, 114 mm. Rockstone. (C. M. Cat. No. 1816.)

Three specimens, 115–130 mm. Locality? (C. M. Cat. No. 1817; I. U. Cat. No. 12109.)

Twelve specimens, 223–275 mm. Tukeit. (C. M. Cat. No. 1818*a–b*; I. U. Cat. No. 12107.)

Head 3.5–4; depth 2.6–2.8; D. 11; A. 26 or 27; scales 9–52–53–4; eye 3.4–3.75 in head, 1.66–2 in interorbital, about equal to the length of the snout.

Elongate oval, the dorsal and ventral outlines about equally convex; preventral area broad, flattish; postventral area narrowly rounded; predorsal area narrowly rounded, without a definite median series of scales; head broad, the convex profile in front of the dorsal but little depressed over the eyes; second suborbital in contact with the angle of the preopercle, a narrow naked margin between it and the upper and lower limits of the preopercle.

Upper jaw but slightly projecting, only the outer row of the premaxillary exposed; seven to ten teeth in the outer series in each premaxillary, six in the inner row and four between the two series; three large teeth on each side of the mandible, with graduated teeth on the sides.

Origin of dorsal equidistant from tip of snout and base of middle caudal rays; dorsal obliquely truncate or slightly emarginate. Adipose fin well-developed. Caudal emarginate when opened, the middle rays forming a small projecting lobe; anal slightly emarginate in front; ventrals reaching beyond vent, but not to anal, pectorals not quite to ventrals.

A humeral spot just behind the opercle above the lateral line. A conspicuous V-shaped black band on the caudal; base of anal black; sides highly iridescent, darker above; dark lines along the middle of the rows of scales above the lateral line; dorsal, adipose, and upper caudal margin rosy; an orange band parallel with the black band on caudal and anal in the smaller specimens in life. In the larger the dorsal, adipose, caudal and anal are dirty orange.

I have examined the types of *B. falcatus* and *B. schomburgkii* in Berlin. The latter is undoubtedly the young of the former. It agrees with it in the markings of both the fins and in the lateral bands, which follow the middle of the rows of scales.

227. **Brycon siebenthalæ** sp. nov. (Plate LIV, fig. 3.)

One specimen, 204 mm. Mud Creek, Aruka River. (C. M. Cat. No. 1819.)

Head 4; depth 3; D. 11; A. 26; scales 12–64–7. Eye 1 in snout, 3.75 in head, 2 in interorbital.

Compressed; head short, blunt, broad; ventral profile regularly and more greatly arched than the dorsal; preventral area rounded, predorsal region bluntly keeled.

Interorbital arched; second suborbital leaving a narrow naked margin; upper jaw scarcely projecting; twelve teeth in the outer series of the upper jaw; four large teeth in the outer row of the lower jaw.

Origin of dorsal midway between tip of snout and base of middle caudal rays, the third ray longest, equal to head without operele; caudal broad, emarginate, the lobes rounded, 4.5 in the length; pectorals not reaching ventrals.

A faint humeral spot; series of dark lines between the rows of scales, most conspicuous over the anal.

Pectorals and ventrals blue-black, the remaining fins dark.

I take pleasure in naming this species for Miss Maud Siebenthal, who has prepared many of the illustrations for this volume.

Chalceus Cuvier.

Chalceus Cuvier, Mém. Mus. d'Hist. Nat., IV, 454.

Type, *Chalceus macrolepidotus* Cuvier.

With the dentition of *Brycon*, but an outer series of multicuspid and an inner series of conical teeth in the lower jaw; three series of teeth in the premaxillary. Scales of the back and down to the lateral line very large; lateral line much decurved, the scales below it much smaller than those above it. Gill-membranes free; belly rounded.

A single species is known.

228. **Chalceus macrolepidotus** Cuvier.

Chalceus macrolepidotus Cuvier, Mém. Mus. d'Hist. Nat., IV, 454, pl. 21, fig. 1.—Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 240.—Schomburgk, Fishes Brit. Guiana, I, 1841, 216, pl. 14 (Essequibo).—Günther,

Catalogue, V, 1864, 333 (Essequibo; River Cupai; British Guiana).—Cope, Proc. Acad. Nat. Sci. Phila., 1871, 262 (Ambyiacu).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 55.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 439.

Brycon macrolepidotus Müller and Troschel, Horæ Ichth., I, 1845, 15; in Schomburgk, Reisen, III, 1848, 635 (Essequibo; Mazaruni).

Chalceus araraqcera Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 244 (Essequibo).

Five specimens, 93–214 mm. Konawaruk. (C. M. Cat. No. 1961*a–c*; I. U. Cat. No. 12202.)

Five specimens, 95–110 mm. Gluck Island. (C. M. Cat. No. 1962*a–c*; I. U. Cat. No. 12203.)

Twenty-six specimens, 93–244 mm. Tumatumari. (C. M. Cat. No. 1963*a–f*; I. U. Cat. No. 12204.)

Head 3.5–4; depth 3.6; D. 12; A. 11; scales 3.25–37 or 38–2, twenty to twenty-two scales in the series just above the lateral line. Eye 1.3 in snout, 3.6 in head, 2 in interorbital; 1, 3, 1.3 respectively in the young.

Elongate, ventral profile with a greater arch than the dorsal; ventral surface rounded, with a regular median series of scales; dorsal surface very broad, with a median series of seven scales before the dorsal; profile from the dorsal to the snout slightly curved, little descending; head broad, smooth, and flat above, the fontanels linear, becoming obliterated with age; occipital process very short, scarcely evident externally.

Cheeks with a narrow naked margin behind in the adult; the second suborbital in contact with the lower limb of the preopercle, but leaving a naked margin in the adult; premaxillaries meeting at an angle, with a considerable horizontal extent, meeting the straight-margined premaxillaries at an angle. Mouth terminal, the upper jaw projecting; the teeth much as in *Brycon*, lower jaw with two series of teeth; those of the outer series graduated, multicuspid, with ribbed convex outer sur- and concave inner surface, fourteen on each side; inner series consisting of minute face conical teeth, much more numerous than those of the outer series, the median pair much enlarged; each premaxillary with an outer series of about ten tricuspid slightly graduated teeth; an inner series of about six multicuspid teeth, of which the second is the largest, those following rapidly graduated; a middle series of two teeth, one outward from the space between the first and second of the inner series and one outward from the space between the second and third; maxillary with a series of teeth for nearly its entire length, those near its angle tricuspid,

those farther out conical. Gill-membranes free from the isthmus and from each other; gill-rakers about 7 + 11.

Scales of the back and sides large, with membranous border; each scale with a few large, and a multitude of minute, reticulating lines; a well-developed axillary scale; fins naked.

Origin of dorsal equidistant from eye and caudal, its height about 5.5 in the length; caudal broadly lobed, the lobes about 4 in the length; adipose fin small; anal short, emarginate, its lobe oblique, the longest ray usually extending beyond the tip of the last. Ventrals reaching about half-way to middle of anal, pectorals three-fourths to ventrals.

Iridescent, plumbeous above; caudal and adipose deep maroon; dorsal rays similar, the membranes lighter; middle of ventral and pectorals maroon; lower parts yellowish-white, a maroon streak from above anal to above pectorals.

Subfamily Stethaprioninæ.

Fowlerina Eigenmann.

Fowlerina Eigenmann, Am. Nat., XVI, 1882, 772.

Type, *Tetragonopterus compressus* Günther.

Predorsal spine scale-like, concave below, fitting into a notch in the back in front of the dorsal fin. Caudal scaled; anal long, with one row of scales. Scales 34–36; preventral region with a median series of scales, none spinous.

229. **Fowlerina orbicularis** (Cuvier and Valenciennes). (Plate XLVI, fig. 2.)

Tetragonopterus orbicularis Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 138 (Essequibo; Amazon).—Castelnau, Anim. Am. Sud, Poiss., 1855, 65, pl. 32, fig. 3 (Amazon).—Kner, "Familie der Characinen," i, 1859, 38 (Villa Maria).—Günther, Catalogue, V, 1864, 320; Ann. and Mag. Nat. Hist., (5), VI, 1880, 12 (La Plata).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 52.—Ulrey, Ann. N. Y. Acad. Sci., VIII, 1895, 276.—Vaillant, Bull. Mus. d'Hist. Nat., V, 1899, 155 (Carnot).

Fowlerina orbicularis Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 441.

Tetragonopterus compressus Günther, Catalogue, V, 1864, 319 (Essequibo; Surinam, Marañon).

Brachychalcinus retrospina (in part) Boulenger, Ann. and Mag. Nat. Hist., (6), X, 1892, 12 (Santa Cruz).

Fowlerina paraguayensis Eigenmann, Ann. Carnegie Mus., IV, 1907, 153.

Nineteen specimens, 41–81 mm. Crab Falls. (C. M. Cat. No. 1946*a–e*; I. U. Cat. No. 12207.)

Three specimens, 44–50 mm. Lama Stop-Off. (C. M. Cat. No. 1947*a*; I. U. Cat. No. 12208.)

One specimen, 50 mm. Amatuk. (C. M. Cat. No. 1948.)

Two specimens, 58–87 mm. Creek below Potaro Landing. (C. M. Cat. No. 1949; I. U. Cat. No. 12209.)

Seventy-two specimens, the largest 71 mm., most of them about 50 mm. Konawaruk. (C. M. Cat. Nos. 1950*a–i*, and 2454 (figured); I. U. Cat. No. 12210.)

Eighteen specimens, 96–115 mm. Kangaruma. (C. M. Cat. No. 1951*a–e*; I. U. Cat. No. 12211.)

Twenty-four specimens, 40–83 mm. Rockstone. (C. M. Cat. No. 1952*a–e*; I. U. Cat. No. 12212.)

Ninety-eight specimens, the largest 75 mm. Tumatumari. (C. M. Cat. No. 1953*a–i*; I. U. Cat. No. 12213.)

One hundred and sixty-four specimens, the largest 70 mm. Wismar. (C. M. Cat. No. 1954*a–x*; I. U. Cat. No. 12214.)

Seven specimens, 45–52 mm. Warraputa. (C. M. Cat. No. 1955*a–d*; I. U. Cat. No. 12215.)

Five specimens, 55–71 mm. Label lost, either Botanic Gardens or mud-flats below Wismar. (C. M. Cat. No. 1956*a–e*; I. U. Cat. No. 12216.)

Eight specimens, 45–62 mm. Erukin. (C. M. Cat. No. 2206*a–d*; I. U. Cat. No. 12362.)

Head about 4; depth nearly 2 in the young, 1.4 in some of the largest; D. 11 or 12; A. 30–34, most frequently 32; scales 8–34 to 36–6 to 8. Eye .7 in the snout, 2.4–2.6 in the head, 1+ in the interorbital.

Extremely deep and compressed, preventral surface bluntly keeled; in part covered by median scales, in part by scales bent over the ridge; predorsal area keeled, with a median series of about eight scales; ventral arch more pronounced than the dorsal; anal base straight; predorsal profile arched, with a distinct depression over the eyes; occipital process, as in all deep species, very long and narrow, reaching one-third of the way to the dorsal, bordered by five scales on each side; predorsal spine in old individuals more or less leaf-shaped, with entire margins, in the young hastate, with a retrorse barb on each side; fontanel narrow, the parietal continued as a deep groove on the occipital process.

Second suborbital leaving but a very narrow naked margin in the adult; jaws equal, the premaxillary with a short horizontal extent, meeting the maxillary at an

angle; dentition as in *Tetragonopterus*, premaxillary with an inner series of about five teeth, whose denticles are in a crescent, and an outer series of four or more teeth, the second or third withdrawn from the line of the rest; dentary with four large teeth, abruptly followed by minute teeth on the side; maxillary slender, with as many as three teeth on its upper angle, these scarcely evident in small specimens.

Gill-rakers long, slender, 10 + 16.

Scales regularly imbricated, except over the anal musculature, each scale with a few radiating striæ; lateral line but slightly decurved; anal with a sheath of two rows of scales, which are continuous with those of the sides; caudal lobes with minute scales for more than half their length.

Dorsal pointed, the highest ray in the young reaching the adipose, shorter in the adult; adipose large; caudal forked, anal emarginate, more so in young than in adult; ventrals reaching to, or a little beyond, the origin of the anal, pectorals to above the middle of the ventrals.

Highly iridescent, silvery; a silvery lateral band; two vertical humeral bars, the second merging into the pigmentation of the sides; outer margin of ventrals and anterior margin of anal frequently black; fins variously peppered.

The specimens from Erukin differ from the rest as follows: the dorsal and anal are falcate, the longest dorsal rays reaching beyond the origin of the adipose, the longest anal ray to the base of the twenty-fifth ray.

Subfamily Chalcininæ.

Chalcinus Cuvier and Valenciennes.

Chalceus Müller and Troschel, Horæ Ichth., I, 1845, 15 (*angulatus*), not of Cuvier and Valenciennes.

Chalcinus Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 258 (*brachypomus*).

Triportheus Cope, Proc. Acad. Nat. Sci. Phila., 1871, 264, pl. 8, fig. 3, and pl. 14, fig. 1 (*flavus*).

Coscinoxyron Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 450 (*culter*).

Type, *Chalcinus brachypomus* Cuvier and Valenciennes.

Compressed, large-scaled, herring-like fishes; lateral line decurved; preventral edge compressed; pectoral large; mouth small, a pair of conical teeth in the lower jaw behind a series of lobed teeth; upper jaw with two series of teeth; caudal emarginate, the middle rays prolonged.

The species and varieties, about thirteen in number, differ from each other but slightly. Within our limits one species is found about Morawhanna, another in the Essequibo and Demerara. They may be distinguished as follows:

KEY TO THE GUIANA SPECIES OF CHALCINUS.

a. Six scales between the dorsal and the lateral line; twenty to twenty-five rakers on the lower limb of the first gill-arch; depth in the largest 3.3–3.4 in the length; caudal peduncle slender, its width equal to half of its depth in the largest; lateral line 40–43; A. 27–30. ..... elongatus.

aa. Five scales between the dorsal and the lateral line; thirty to forty-two rakers on the lower limb; depth in the largest 3 in the length; caudal peduncle compressed, its width equal to one-third of its depth in the largest; pectoral much broader than in the preceding species; lateral line 35–37; A. 26 or 27; origin of anal under last dorsal ray. ..... rotundatus.

230. **Chalcinus elongatus** Günther.

Chalcinus elongatus GÜNTHER, Catalogue, V, 1848, 342.—STEINDACHNER, "Ichthyologische Beiträge," v, 1876, 54 (Teffé; Peruvian Amazon); "Flussfische Südamerika's," i, 1879, 9 (Orinoco near Ciudad Bolivar).—GARMAN, Bull. Essex Inst., XXII, 1890, 6 (Arary; Cameta; Gurupa; Içа; José Fernandez; Jutahy; Lago Alexo; Lake Hyanuary; Lake José Assu; Manacapuru; Manaos; Montalegre; Obidos; Pará; Porto do Moz; Rio Negro; Santarem; Silva, Lake Saraca; Tabatinga; Teffé; Tonantins; Villa Bella).—EIGENMANN and EIGENMANN, Proc. U. S. Nat. Mus., XIV, 1891, 56.—EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 440.

One specimen, 213 mm. Aruka River. (C. M. Cat. No. 1999*a*.)

Two specimens, 200 mm. Koreabo Rubber Plantation. (C. M. Cat. No. 2000; I. U. Cat. No. 12247.)

Seven specimens, 93–142 mm. Creek in Mora Passage. (C. M. Cat. No. 2057*a–c*; I. U. Cat. No. 12250.)

Ten specimens, 107–115 mm. Trenches in Morawhanna. (C. M. Cat. No. 2058*a–b*; I. U. Cat. No. 12248.)

231. **Chalcinus rotundatus** (Schomburgk). (Plate LV, fig. 1.)

Chalceus rotundatus SCHOMBURGK, Fishes Brit. Guiana, I, 1840, 209 (Padauiri).

Chalcinus brachypomus CUVIER and VALENCIENNES, Hist. Nat. Poiss., XXII, 1848, 259 (Maná; Essequibo).—GÜNTHER, Catalogue, V, 1864, 339 (Essequibo).—STEINDACHNER, "Ichthyologische Beiträge, v, 1876, 49 (Demerara; Santarem; Villa Bella).—PELLEGRIN, Bull. Mus. d'Hist. Nat., V, 1899, 157 (Apuré).—FOWLER, Proc. Acad. Nat. Sci. Phila., 1906, 1449, fig. 43 (Demerara River).

Chalceus angulatus (not of Spix) MÜLLER and TROSCHEL, in Schomburgk, Reisen, III, 1848, 635 (Essequibo and Rupununi).

Chalcinus güntheri GARMAN, Bull. Essex Inst., XXII, 1890, 4 (San Francisco).—

Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 56.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 440.

One specimen, 187 mm. Wismar. (C. M. Cat. No. 2059.)

Three specimens, 51–111 mm. Bartica. (C. M. Cat. No. 2060; I. U. Cat. No. 12249.)

Thirty specimens, 110–155 mm. Crab Falls. (C. M. Cat. No. 1261*a–e*; I. U. Cat. No. 12251.)

The caudal in some specimens is quite yellow, in others not. It is watered with black.

This species was quite abundant about Rockstone. It is difficult to obtain except by the tedious process of angling with a minute hook. A small school came about the rocks where some fish were being cleaned at Crab Falls. These were secured.

Subfamily Gasteropelecinæ.

Carnegiella Eigenmann.

Carnegiella Eigenmann, Ann. Carnegie Mus., VI, 1909, 13.

Type, *Gasteropelecus strigatus* Günther.

Carnegiella is distinguished from *Gasteropelecus* by the following general characters: No adipose fin. Premaxillary with about nine tricuspid teeth in a single series; maxillary with a single large, conical tooth at its upper anterior angle.

232. Carnegiella strigata (Günther). (Plate LV, figs. 2, 3.)

Gasteropelecus strigatus Günther, Catalogue, V, 1864, 343 (habitat ?).—Steindachner, "Ichthyologische Beiträge," v, 1876, 56 (Manacapurú).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 57.

Carnegiella strigata Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 439.

Gasteropelecus fasciatus Garman, Bull. Essex Inst., XXII, 1890, 10 (Saraca; Tabatinga).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 57.

Sixty-eight specimens, 20–42 mm. Maduni Creek. (C. M. Cat. No. 1296*a–o*; I. U. Cat. No. 11784.)

Forty-three specimens, 30–37 mm. Woodland brook on Gluck Island. (C. M. Cat. No. 1297*a–o*; I. U. Cat. No. 11785.)

Fourteen specimens, 30–39 mm. Malali. (C. M. Cat. No. 1298*a–e*; I. U. Cat. No. 11786.)

Seven specimens, 33–36 mm. Tumatumari. (C. M. Cat. No. 1299*a–c*; I. U. Cat. No. 11787.)

Sixteen specimens, 35–44 mm. Creek below Potaro Landing. (C. M. Cat. No. 1300*a–e*; I. U. Cat. No. 11788.)

Two specimens, 30 mm. Rupununi Pan. (C. M. Cat. No. 1301.)

Fifteen specimens, 30–36 mm. Wismar. (C. M. Cat. No. 2062*a–h*; I. U. Cat. No. 12252.)

Twenty-four specimens, 24–39 mm. Rockstone sand-bank. (C. M. Cat. No. 2063*a–l*; I. U. Cat. No. 12253.)

This species is found in small woodland streams, contrasting thus with the species of *Gasteropelecus*, which are pelagic (in the larger rivers) in their habits.

Head about 4; depth about 2; D. 10; A. 27–29; scales 30, twelve to fifteen pores in the lateral line, the line broken after the sixth scale; eye 3 in the distance from tip of chin to end of opercle.

Easily recognized by its markings, for which see figure.

The types of *G. strigatus* in the British Museum are in a bad state of preservation, but are undoubtedly identical with *G. fasciatus* of Garman.

Gasteropelecus Gronow.

Gasteropelecus Gronow, Mus. Ichth., II, 1756, 7.—Günther, Catalogue, V, 1864, 342.

Type, *Clupea sternicla* Linnæus.

Short and deep; breast unduly expanded, trenchant, the pectorals very large; lateral line extending down to near the origin of anal; an adipose fin; a single series of premaxillary teeth; three large conical teeth along the margin of the maxillary.

233. Gasteropelecus sternicla (Linnæus). (Plate LV, fig. 4.)

Gasteropelecus Gronow, Mus. Ichth., II, 1756, 7, No. 255, pl. 7, fig. 5 (Surinam).

Clupea sternicla Linnæus, Syst. Nat., ed. 10, I, 1758, 319 (Surinam).—Kœlreuter, Nov. Com. Acad. Sci. Petropoli, VIII, 1761, 405, pl. 14, figs. 1–3.

Gasteropelecus sternicla Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 169, pl. 640 (Surinam).—Kner, Denkschr. Akad. Wiss. Wien, XVIII, 1860, 16.—Gronow, Cat. Fish, ed. Gray, 1854, 171.—Günther, Catalogue, V, 1864, 342 (Essequibo).—Garman, Bull. Essex Inst., XXII, 1890, 8 (Tabatinga; Lago Alexo; Pará; Curupira; Cudajas).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 56.—Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 452 (Surinam).—Eigenmann and Ogle, Proc. U. S. Nat. Mus., XXXIII,

1907, 30 (Pará; Guiana).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 439.

Salmo gasteropelecus Pallas, Spic. Zool., VIII, 1769, 80, pl. 3, fig. 4.—Gmelin, Syst. Nat., I, iii, 1788, 1384.—Bloch, Ausl. Fische, III, 1785, 66, pl. 97, fig. 3.—Bloch and Schneider, Syst. Ichth., 1801, 418.

Twelve specimens, 50–64 mm. Mud-flats below Wismar. (I. U. Cat. No. 11666.)

Thirteen specimens, 48–65 mm. Wismar. (C. M. Cat. No. 1101*a–c*; I. U. Cat. No. 11667.)

Twelve specimens, 42–52 mm. Mora Passage. (C. M. Cat. No. 1099*a–c*; I. U. Cat. No. 11668.)

Twelve specimens, 41–51 mm. Trenches of Morawhanna. (C. M. Cat. No. 1098*a–c*; I. U. Cat. No. 11669.)

One specimen, Issorora. (C. M. Cat. No. 1100.)

Fifteen specimens, 48–56 mm. Mud Creek in Aruka River. (C. M. Cat. No. 1097*a–c*; I. U. Cat. No. 11670.)

Head 4–4.25; depth 1.75–2; D. 11; A. 31–33; scales 35; nineteen pores in the lateral line; eye 3 in the head, 1.5 in the interorbital.

Silvery, with a dark line along base of the anal; a dark band from upper part of gill-openings to the caudal; sometimes narrower lines following the rows of scales above this.

Subfamily Serrasalminæ.

Serrasalmo Lacépède.

Serrasalmo Lacépède, Hist. Nat. Poiss., V, 1804, 283.

Type, *Salmo rhombeus* Linnæus.

Belly trenchant, serrate; premaxillary with a single series of teeth; a series of triangular teeth on each side of the palate.

Key to the Guiana Species of Serrasalmo.

a. Caudal margined with white or hyaline; D. 15 or 16; A. 32–37; ventral serræ 28–33; head 3+; depth 1.6–1.7; cheeks with a naked area (in specimens 120 mm. long) equal to one-half of the second suborbital; snout blunt, shorter than the eye. A large diffuse humeral spot.....**gymnogenys.**

aa. Caudal margined with black, the base also black, the hyaline middle area decreasing with age; D. 16 or 17; A. 31–35; serræ 30–36; head 3; depth nearly 2; cheeks entirely covered by the second suborbital or a very narrow naked margin; snout acute, especially in the young, at least equal to the eye in 176-mm. specimens; humeral spot obscure or none.....**rhombeus.**

234. Serrasalmo gymnogenys Günther.

? *Salmo aureus* (not of Spix) Müller and Troschel, in Schomburgk, Reisen, III, 1848, 637 (Essequibo; Rupununi).

Serrasalmo gymnogenys Günther, Catalogue, V, 1864, 371 (River Capin; British Guiana).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 60.—Ulrey, Ann. N. Y. Acad. Sci., VII, 1895, 298 (Marajo).—? Perugia, Ann. Mus. Genova, (2*a*), X, 1891, 650 (Resistencia, Chaco Centrale).—Pellegrin, Bull. Mus. d'Hist. Nat., V, 1899, 157 (Apuré).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 442.

Twenty-six specimens, 31–144 mm. Rockstone. (C. M. Cat. Nos. 1108*a–c* and 1122*a–d*; I. U. Cat. No. 11646.)

One specimen, 57 mm. Wismar. (C. M. Cat. No. 1111.)

One specimen, 47 mm. Tumatumari. (C. M. Cat. No. 1112*a*.)

Two specimens, 37–125 mm. Crab Falls. (C. M. Cat. No. 1130*a*; I. U. Cat. No. 11647.)

Four specimens, 104–141 mm. Below Packeoo. (C. M. Cat. No. 1133*a*; I. U. Cat. No. 11645*a–b*.)

Head 3.1–3.25; depth 1.6–1.7; D. 15 or 16; A. 32–37; ventral serræ 22–33, of which one is bifid before the anus and one grooved with two antrorse and two retrorse spines behind the anus; lateral line 77–80; eye 3.25 in the head, 1.3 in the interorbital, .6 in the snout.

Deep; snout obliquely truncate, the chin projecting; second suborbital leaving from one-third to two-sevenths of the cheek naked; opercles and suborbitals profusely striate; gill-rakers minute, about 10 + 10; teeth oblique, usually with a notch on one side, sometimes on both sides on those of the premaxillary; premaxillary with seven teeth, of which the third is very much smaller than the rest; lower jaw with seven slightly graduated teeth.

Dorsal short, rounded, its base a little longer than its distance from the adipose; adipose short; caudal lunate; anal with a slight lobe in front; ventrals reaching to the anal groove or a little shorter; pectorals to, or a little past, the vertical from the origin of the ventrals.

First few scales of the lateral line larger than the neighboring scales, becoming smaller on the sides than those above or below the line, but of the same number as there are transverse series; scales regularly imbricate.

A large diffuse humeral spot; sides variously spotted; caudal with a basal V-shaped black band, increasing in width with age; opercles rosy in life, the color most intense on the lower corner of the opercle, the red sometimes extending over the lower part of the sides and breast; anal tinged with orange in front.

I have examined one of the specimens mentioned as *aureus* by Müller and Troschel. It agrees with specimens taken by me in all but the color of the caudal,

which, in addition to the basal band, has a submarginal black band, a narrower margin being hyaline.

235. Serrasalmo rhombeus (Linnæus). (Plate LVI, fig. 1.)

Salmo rhombeus Linnæus, Syst. Nat., ed. 12, I, 1766, 514 (Surinam).—Gmelin, Syst. Nat., I, iii, 1788, 686, No. 28.—? Bloch, Ausl. Fische, 1795, pl. 383.—Bloch and Schneider, Syst. Ichth., 1801, 404.—Pallas, Spic. Zool., VIII, 1769, 57, pl. 5, fig. 3.

Serrasalmo rhombeus Lacépède, Hist. Nat. Poiss., V, 1804, 284.—Cuvier, Mém. Mus. d'Hist. Nat., V, 1819, 367.—Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 272 (Araguay).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 637 (Rupununi; Takutu).—Castelnau, Anim. Am. Sud, Poiss., 1855, pl. 37, fig. 3.—Günther, Catalogue, V, 1864, 369 (Essequibo; Surinam; Demerara).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 60.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 442.

Three specimens, 70–232 mm. Wismar. (C. M. Cat. No. 1131*a–b*; I. U. Cat. No. 11648.)

Six specimens, 150–355 mm. Crab Falls. (C. M. Cat. Nos. 1127 and 1132; I. U. Cat. Nos. 11649 and 11653.)

Two specimens, 209–295 mm. Packeoo. (C. M. Cat. No. 2224*a*; I. U. Cat. No. 11650.)

One specimen, 110 mm. Twoca Pan. (C. M. Cat. No. 1134.)

Seven specimens, 137–261 mm. Tumatumari. (C. M. Cat. No. 1120*a–b*; I. U. Cat. No. 11651.)

Nine specimens, 39–57, and one 257 mm. Rockstone. (C. M. Cat. Nos. 1126*a* and 1741*a–c*; I. U. Cat. No. 11652.)

Head 3; depth 1.8–2; D. 16 or 17 in the ratio of one to two; A. in two, 31; in four, 32; in two, 33; in five, 34; and in four, 36; lateral line 87–91. Abdominal serræ usually 30–33, rarely 28 or 36, of which there is one bifid before the anus and one grooved behind the anus. Eye 4.5 in head, 2 in interorbital, 1–1.25 in snout.

Snout pointed, the lower jaw entering the profile; second suborbital covering the entire cheek or leaving a narrow naked margin; opercles and suborbitals profusely striate; gill-rakers minute, about 10 + 10; teeth as in *gymnogenys*.

Dorsal obliquely rounded, its base as long as, or longer than, its distance from the posterior end of the base of the adipose; caudal slightly lunate; anal margin very slightly concave, no anal lobe; ventrals not reaching anal groove; pectorals about to ventrals.

Scales a little less regular than in *gymnogenys*.

Sides more or less obscurely spotted; humeral spot obscure or none; vertical fins nearly black; a lunate light spot, largest in the young, in the center of the caudal.

236. Serrasalmo stagnatilis Schomburgk.

"Arri" (of the Macusi Indians).

Serrasalmo stagnatilis Schomburgk, Fishes Brit. Guiana, I, 1841, 222. (D. 17; A. 32; P. 15.)

I am not able to place this species.

Pygocentrus Müller and Troschel.

Pygocentrus Müller and Troschel, Horæ Ichth., I, 1845, 20.

Type, *Serrasalmo piraya* Cuvier.

Belly trenchant, serrate; premaxillary with a single series of teeth; no teeth on the palate; teeth in the jaws trenchant; those of the upper jaw with a notch on the lateral edge; anal partly scaled.

Key to the Guiana Species of Pygocentrus.

a. Abdominal serræ 40; depth 1.7–2; D. 18; A. 33–35; lateral line 105; interorbital a little less than half the length of the head; second suborbital in contact with the preopercle..... **niger.**

aa. Abdominal serræ less than 35.

b. Depth about 2 in the length; head heavy, about 3 in the length. D. 17–18; A. 30–33; lateral line 95–100; abdominal serræ 24–27; snout short, very blunt; interorbital nearly half the length of the head; a very narrow naked area on the cheek; origin of dorsal nearly equidistant from base of middle caudal rays and front of eye; anal slightly falcate; sides profusely spotted; a V-shaped black bar on the base of the caudal; margin of caudal dark; adipose fin rayed in the adult. **piraya.**

bb. Depth 1.6–1.75; head 3.12–3.5; D. 15 or 16; A. 32–34; lateral line 90; abdominal serræ 27–33; snout short, blunt, 4.33 in the head; eye 3.5–4; interorbital 2.33; a narrow lens-shaped naked area on the cheek, not more than one-fourth as wide as the second interorbital; origin of dorsal about equidistant from base of middle caudal rays and front of eye. Gill-rakers minute, about fifteen on the lower limb; a large diffuse humeral blotch; sides with numerous small spots; caudal in the adult with a narrow hyaline margin, the rest of the fin black; in the young hyaline, with a faint basal V-shaped bar..... **scapularis.**

bbb. Depth 1.42; head 3.33; D. 15 or 16; A. 30–33; abdominal serræ 30 or 31; lateral line 73–76; snout pointed, equal to the eye, 3.5 in the head; interorbital 2.5 in the head; a lens-shaped naked area in the angle of the preopercle, nearly half as high as the second suborbital; origin of dorsal but little nearer to base of caudal than to tip of snout; about eight minute gill-rakers on the lower arch; a prominent humeral spot; sides obscurely spotted; margin of caudal and a V-shaped basal band black; scales along base of anal and the anal margin black; base of anal white; dorsal and adipose blackish..... **bilineatus.**

237. Pygocentrus niger (Schomburgk).

Serrasalmo niger Schomburgk, Fishes Brit. Guiana, I, 1841, 225, pl. 18 (in streams between forty and one hundred and fifty miles from coast).—Günther, Catalogue, V, 1864, 369.

Pygocentrus niger Müller and Troschel, Horæ Ichth., I, 1845, 21, pl. 2, fig. 3.—Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 286 (Corentyn).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 636 (upper courses of all streams).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 59.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 442.

No specimens of this species were secured. It is said to be very abundant and the most voracious of the "Perais." I have examined the specimen figured by Müller and Troschel. It has forty abdominal serræ and its depth is equal to half the length.

238. Pygocentrus piraya (Cuvier).

"Piraya," Marcgrave, Hist. Rer. Nat. Bras., 1648, 164.

Serrasalmo piraya Cuvier, Mém. Mus. d'Hist. Nat., V, 1819, 368, pl. 28, fig. 4.—Günther, Catalogue, V, 1864, 368 (Brazil; River Cupai; Demerara).—Cope, Proc. Am. Philos. Soc., XI, 1870, 566 (Pará).—Steindachner, "Flussfische Südamerika's," ii, 1881, 13 (Teffé; Rio Puty).—Perugia, Ann. Mus. Genova, (2*a*), X, 1891, 51 (Villa Maria; Matto Grosso; Rio Paraguay).

Pygocentrus piraya Müller and Troschel, Horæ Ichth., I, 1845, 20.—Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 291.—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 636 (generally distributed in Brit. Guiana).—Kner, "Familie der Characinen," ii, 1859, 28.—? Castelnau, Anim. Am. Sud, Poiss., 1855, 72, pl. 38, fig. 2 (Goyaz; Amazon).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 59.—Ulrey, Ann. N. Y. Acad. Sci., VII, 1895, 297 (Trocera on Tocantins).—Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 468 (Pará).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 442.

Serrasalmo (*Pygocentrus*) *piraya* Lütken, Dan. Vidensk. Selsk. Skr., (5), XII, 2, 1875, 233 and xvii (Rio das Velhas).

Serrasalmo piranha Agassiz, Selecta Gen. et Spec. Pisc. Bras., 1829, 71, pl. 28.—Schomburgk, Fishes Brit. Guiana, I, 1841, 221, pl. 16 (Rio Branco).

Serrasalmo nigricans[57] Agassiz, Selecta Gen. et Spec. Pisc. Bras., 1829, 72, pl. 30.—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 636 (generally distributed in British Guiana).

[57] Lütken (*Vidensk. Med. Nat. For. Kjöbenhavn*, 1874, 238) considers this a distinct species. The specimen mentioned by Müller and Troschel, and now in the Berlin Museum, is *P. piraya*.

Pygocentrus bidorsalis (*ex* Natterer, MS.) Kner, "Familie der Characinen," ii, 1854, 28.

Thirteen specimens, 84–109 mm. Twoca Pan. (C. M. Cat. No. 1096*a–d*; I. U. Cat. No. 11639.) Collected by Wm. Grant.

239. **Pygocentrus scapularis** (Günther).

Serrasalmo scapularis Günther, Catalogue, V, 1864, 268 (British Guiana).—Pellegrin, Bull. Mus. d'Hist. Nat., V, 1899, 157 (Apuré).

Pygocentrus scapularis Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 69.—Ulrey, Ann. N. Y. Acad. Sci., VII, 1895, 297 (Marajo).—? Eigenmann and Ogle, Proc. U. S. Nat. Mus., XXXIII, 1907, 35 (South America).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 442.

One specimen, 42 mm. Wismar. (C. M. Cat. No. 1110.)

Twelve specimens, 29–44 mm. Rockstone. (C. M. Cat. No. 1104*a–d*; I. U. Cat. No. 11644.)

Three specimens, 159–184 mm. Crab Falls. (C. M. Cat. No. 1135*a*; I. U. Cat. No. 11638.)

240. **Pygocentrus bilineatus** Eigenmann. (Plate LVI, fig. 2.)

Pygocentrus bilineatus Eigenmann, Ann. Carnegie Mus., VI, 1909, 47; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 442.

Type, 102 mm. Aruka River. (C. M. Cat. No. 1072.)

Cotypes, 95–110 mm. Aruka River. (C. M. Cat. No. 1073; I. U. Cat. No. 11756.)

Cotypes, 43–56 mm. Mora Passage. (C. M. Cat. No. 1074; I. U. Cat. No. 11757.)

Pygopristis Müller and Troschel.

Pygopristis Müller and Troschel, Horæ Ichth., I, 1845, 21, pl. 9, figs. 2*a* and 2*b*.

Type, *Pygopristis fumarius* Müller and Troschel (= *denticulatus* Cuvier).

Belly trenchant, serrate; premaxillary with a single series of teeth; no teeth on the palate; teeth in the jaws serrate or lobed; anal naked except at its base; a procumbent dorsal spine.

241. **Pygopristis denticulatus** (Cuvier).

Serrasalmo denticulatus Cuvier, Mém. Mus. d'Hist. Nat., V, 1819, 371.—Günther, Catalogue, V, 1864, 367 (British Guiana).

Pygopristis denticulatus Müller and Troschel, Horæ Ichth., I, 1845, 21, 34, pl. 9, fig. 1 (Guiana); in Schomburgk, Reisen, III, 1848, 637 (Essequibo; Takutu;

Rupununi).—Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 297 (Essequibo).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 59.—Ulrey, Ann. N. Y. Acad. Sci., VII, 1895, 296 (Lower Amazon).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 441.

Pygopristis fumarius Müller and Troschel, Horæ Ichth., I, 1848, 21, 35, pl. 9, fig. 2; in Schomburgk, Reisen, III, 1848, 637 (Rupununi; Essequibo).—Kner, "Familie der Characinen," ii, 1859, 27 (Rio Branco).

Serrasalmo punctatus Schomburgk, Fishes Brit. Guiana, I, 1841, 223, pl. 17.

Twenty-three specimens, 151–234 mm. Lama Stop-Off. (C. M. Cat. No. 1118*a–d*; I. U. Cat. No. 11637.)

Head 3.5; depth 1.66; D. 18 or 19; A. 34–38; scales with pores 87–95; eye 4 in head, 2 in interorbital; abdominal serræ 36 + 4, 33 + 3, 38 + 4, 31 + 4 in four individuals respectively.

Pumpkin-seed shaped; snout rounded, lower jaw heavy, truncate, its anterior profile forming a continuous oblique line with the snout. Second suborbital leaving four-tenths of the cheeks naked; opercular bones and suborbitals but little striate; mouth small; teeth nearly symmetrical, with a central lobe and two much smaller lobes on each side; six teeth on each premaxillary, in a single series, the third tooth much smaller than the rest.

Gill-rakers 9 + 9, small.

Dorsal broadly rounded, its base equal to its distance from the caudal; adipose short; caudal lobes pointed; anal with its first two or three developed rays slightly prolonged, the rest of the margin of the fin nearly straight; ventrals reaching anal groove, pectorals not quite to ventrals.

Lateral line decurved; anterior scales of the lateral line largest; rows of scales along the middle of the sides more numerous than the pores in the lateral line, the pores corresponding to the rows of scales on the caudal peduncle and over the posterior fourth of the anal; a wide naked area from the dorsal to the occipital.

Dorsal faintly spotted. Iridescent steel-blue above. Pectorals, ventrals, and most of the anal brick-red; opercle orange; a narrow margin of the caudal and anal colorless; caudal submarginally orange, ranging to lemon-yellow and olive.

Subfamily Mylinæ.

Catoprion Müller and Troschel.

Catoprion Müller and Troschel, Horæ Ichth., I, 1845, 22.

Type, *Serrasalmo mento* Cuvier.

Belly serrate; premaxillary with two series of teeth; mandible with a single series of teeth; dorsal falcate; lower jaw projecting, the chin entering the profile.

242. **Catoprion mento** (Cuvier). (Plate LVI, fig. 3.)

Serrasalmo mento Cuvier, Mém. Mus. d'Hist. Nat., V, 1819, 369, pl. 28, fig. 3.

Catoprion mento Müller and Troschel, Horæ Ichth., I, 1845, 22, pl. 2, fig. 5.—Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 304.—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 637 (Lake Amucu).—Kner, "Familie der Characinen," ii, 1859, 26 (Rio Guaporé; Rio Negro).—Günther, Catalogue, V, 1864, 379.—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 61.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 442.

Mylesinus macropterus Ulrey, Ann. N. Y. Acad. Sci., VIII, 1895, 296 (Brazil).

One specimen, 148 mm. Rockstone. (C. M. Cat. No. 1739.)

Three specimens, 75–79 mm. Konawaruk. (C. M. Cat. No. 1740*a–b*; I. U. Cat. No. 11640.)

Head 3.66–4; depth 1.4–1.75; D. 16 or 17; A. 37–39; lateral line 89–94; ventral serræ 33; eye 2.66 in the head, 1 in the interorbital, .75 in the snout.

Rhomboidal; snout very short, sharply pointed, lower jaw much projecting, entering profile; premaxillary with two large, antrorse, conical teeth in an outer series, and three much smaller teeth forming an inner series.

Gill-rakers long and slender, 9 + 14. Lateral line with a sag to below the end of the dorsal; anal entirely naked. Dorsal and anal falcate, the dorsal reaching beyond the middle of the upper caudal lobe, and the anal lobe to the last ray of the dorsal in extreme cases; adipose more than half the length of the dorsal; caudal forked. Silvery, anal lobe pink at base; caudal with a basal, V-shaped black spot.

Mylesinus Cuvier and Valenciennes.

Mylesinus Cuvier and Valenciennes, Hist. Nat. Poiss., 1848, 234.

Type, *Mylesinus schomburgkii* Cuvier and Valenciennes.

Abdomen rounded in front of the ventrals, serrate behind them; premaxillary with six or seven teeth in each side in the front series, of which the first and (if seven) the last are smallest; in the second series two teeth of similar form behind the space between the second and third teeth of the first series and close to them; mandible with seven to thirteen teeth on each side; base of anal scaled. Teeth all flat, thin incisors. Premaxillary teeth three-lobed, the middle lobe much the broader; teeth of the lower jaw flat, rounded, with a notch in front which receives a lobe of the preceding tooth. Dorsal rays prolonged, filiform; jaws nearly equal; anal bilobed; rays in both sexes (during breeding season ?) bifid, one fork turned to the right, the other to the left.

243. **Mylesinus schomburgki** Cuvier and Valenciennes.

Mylesinus schomburgkii Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 235, pl. 644 (based on a head and drawing by Schomburgk).—Kner, "Familie der Characinen," ii, 1859, 24, pl. 3, fig. 7 (Rio Vaupé).—Günther, Catalogue, V, 1864, 366.—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 59.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 442.

No specimens were secured by me.

D. 21–22; A. 32–35; depth 2; head 4; scales 30–100–24; eight to ten abdominal serræ behind the ventrals; posterior half of the anal produced into a lobe; each of the fifteen or sixteen posterior anal rays terminating in two branches, one being bent towards the right, the other towards the left; base of anal scaled; jaws equal; maxillary about reaching the eye.

This species, based on a drawing by Schomburgk, may not have been taken within the region covered by this paper. I examined a specimen in the Paris Museum.

Acnodon Eigenmann.

Acnodon Eigenmann, Smiths. Misc. Coll., Quarterly Issue, XLV, 1904, 147 (*oligocanthus*).

Type, *Myleus oligocanthus* Müller and Troschel.

No spines in front of the ventrals; belly serrate behind; caudal forked; anal falcate or bilobed, entirely naked. Gill-rakers 11 + 11, those of the upper arch very much shorter than those of the lower, the lower one-fourth the diameter of the eye. Four middle teeth of the inner series of the premaxillary with a V-shaped cutting edge; dorsal rays not filiform.

244. **Acnodon oligocanthus** (Müller and Troschel).

Myleus oligocanthus Müller and Troschel, Horæ Ichth., I, 1845, 40, pl. 8, fig. 4 (Surinam).

Myletes oligocanthus Günther, Catalogue, V, 1864, 378 (Demerara).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 61.—Ulrey, Ann. N. Y. Acad. Sci., VIII, 1895, 299 (Brazil).

Acnodon oligocanthus Eigenmann, Smiths. Misc. Coll., Quarterly Issue, XLV, 1904, 147; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 443.

No specimens were secured. I have examined the type in the Berlin Museum from Surinam.

D. 18–19; A. 36–39; depth 2+ ; head 4; eight or nine serræ between ventral and vent; eye 2.5 in the head, interorbital 3.5; dorsal elevated anteriorly; adipose small; scales about 34–85–27. Coloration uniform.

Metynnis Cope.

Metynnis Cope, Proc. Am. Philos. Soc., XVII, 1878, 692 (*luna*).

Sealeina Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 478 (*lippincottianus*).

Type, *Metynnis luna* Cope.

Belly trenchant, serrate; premaxillary with two series of teeth; mandible with a pair of teeth behind the front series; a procumbent predorsal spine; adipose fin more than half the length of the dorsal; free margin of anal slightly convex or with a lobe in front or sinuate; dorsal falcate.

Key to the Guiana Species of Metynnis.

a. Gill-rakers 14 + 18–20, about one-fourth the length of the eye; adipose twice as long as its distance from the dorsal, or longer; caudal lunate; anal low, its margin sinuate, the rays at the beginning of the last third about half as long as eye. A. 40–43; D. 19–20; abdominal serræ 27–33; depth 1.1–1.24. Sides with obscure cross-bands, a humeral spot..... **hypsauchen.**

aa. Gill-rakers 7–12 + 11–13, about one-sixth to one-fourth the length of the eye; adipose but little longer than its distance from the dorsal. Caudal very slightly emarginate; anal high, rays of the beginning of the last third equal to eye. A. 37–40; D. 17–21; serræ 31–35; depth 1.22–1.3; head 3.66; dorsal in the larger spotted; dorsal, adipose, caudal, and anal margined with dusky. A dark oblique bar extending from near end of pectoral up toward origin of dorsal, broken into two spots frequently, sides obscurely spotted..... **maculatus.**

245. **Metynnis hypsauchen** (Müller and Troschel).

Myletes hypsauchen Müller and Troschel, Horæ Ichth., I, 1845, 38, pl. 10, fig. 1 (Essequibo; Guiana).—Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 219 (Amazon).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 637 (Tapacuma Lake).—Kner, "Familie der Characinen," ii, 1859, 18 (Caiçara; Marabitanos).—Günther, Catalogue, V, 1864, 376 (Essequibo River).—Steindachner, "Flussfische Südamerika's," ii, 1881, 28 (Santarem; Teffé; Rio Trombetas; Rio Guaporé); iv, 1882, 16 (Huallaga).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 61.—? Boulenger, Trans. Zool. Soc. London, XIV, 1896, 37 (Descalvados); ? Boll. Mus. Zool. ed Anat. Comp. Torino, XV, 1900, — (near Corumbá).—Eigenmann and Ogle, Proc. U. S. Nat. Mus., XXXIII, 1907, 35 (South America).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 443.

I have examined the types and:

Eleven specimens, 60–110 mm. Rockstone. (C. M. Cat. No. 1125*a–d*; I. U. Cat. No. 11641.)

Four specimens, 61–70 mm. Twoca Pan. (C. M. Cat. No. 1124*a*; I. U. Cat. No. 11642).

One specimen, 44 mm. Bartica. (C. M. Cat. No. 2460*a*.)

The characters of the species are given in the key.

246. Metynnis maculatus (Kner). (Plate LVII, fig. 1.)

Myletes maculatus Kner, "Familie der Characinen," ii, 1859, 18, pl. 2, fig. 5 (Rio Guaporé).—Günther, Catalogue, V, 1864, 377.—Steindachner, "Flussfische Südamerika's," ii, 1881, 28 (Maroni River, Guiana).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 61.—? Perugia, Ann. Mus. Genova, (2), XVIII, 1897, 26 (Reyes; Rio Beni).—Vaillant, Bull. Mus. d'Hist. Nat., V, 1899, 154 (Carsevenne).

Methynnis maculatus Berg, An. Mus. Nac. Buenos Aires, V, 1897, 286 (San Pedro on Rio Paraná).

Metynnis maculatus Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 443.

Six specimens, 144–176 mm. Lama Stop-Off. (C. M. Cat. No. 1119*a–b*; I. U. Cat. No. 11661.)

One specimen, 65 mm. Rockstone. (C. M. Cat. No. 2216.)

Six specimens, 76–83 mm. Twoca Pan. (C. M. Cat. No. 1123*a–b*; I. U. Cat. No. 11643.)

Iridescent steel-blue above; opercles very bright orange; lower parts white, tinged with orange; anal orange in front, fading out behind; margin of caudal bluish, with a submarginal orange band, rest of caudal olive; pectorals yellowish.

Myloplus Gill.

Myletes (not of Cuvier) Müller and Troschel, Horæ Ichth., I, 1845, 22 (*asterias*).—Günther, Catalogue, V, 1864, 372.

Myloplus Gill, Proc. U. S. Nat. Mus., XVIII, 1895, 214, substitute for *Myletes* of Müller and Troschel and of Günther (*asterias* by implication).

Type, *Myletes asterias* Müller and Troschel.

Belly trenchant, serrate; premaxillary with two series of teeth, separated from each other; mandible with a pair of conical teeth; a procumbent predorsal spine; adipose fin short; gill-rakers short, lanceolate; dorsal rays 21–31; cheeks largely naked.

Anal frequently (always?) bilobed in the male, falcate in the female.

On account of such a comparatively small number of the species of this genus having been secured no description beyond a brief key to the species is here attempted.

It is very probable that the anal in the males of all of the species, certainly in some of them, is bilobed, *i. e.*, the anterior rays and those near the middle of the fin are prolonged. The anal in the female is falcate in all of the species so far placed on record.

KEY TO THE GUIANA SPECIES OF MYLOPLUS.

a. Sides with an oblique cross-band; serræ 33–35; D. 23–25, the anterior rays filiform in the male; the anal bilobed, falcate in female..... schomburgki.[58]

aa. Sides plain.

b. D. 26–31; depth 1.25–1.6 in the length, distance between origin of anal and origin of dorsal 1.3 in the length without the head; adipose fin .5 or .6 of the length of the eye; base of last dorsal ray about equidistant from end of lateral line and base of fourth to eighth ray. Anal falcate, 36–44; serræ 37–49. Origin of dorsal nearer to snout than to end of lateral line..... rubripinnis.

bb. D. 24 or 25; A. 35 or 36; depth 1.5 in the length; adipose fin .8 of the length of the eye or equal to it; base of dorsal 3.5–3.8 in the length; base of last dorsal ray equidistant from the base of the first ray and the eleventh scale from the end of the lateral line; serræ 37–41..... rhomboidalis.

aaa. Sides with orange spots; D. 27–31; A. 35–40; depth 1.66 in the length; distance from origin of anal to origin of dorsal 1.5 in the length, much less than length of head; origin of the dorsal nearer to end of lateral line than to tip of snout. Serræ 36–38; anal falcate in the female, bilobed in the male. asterias.

247. **Myloplus rubripinnis** (Müller and Troschel). (Plate LVII, fig. 2.)

Myletes rubripinnis MÜLLER and TROSCHEL, Horæ Ichth., I, 1845, 28, pl. 9, fig. 3 (Essequibo); in Schomburgk, Reisen, III, 1848, 637 (Essequibo).—GÜNTHER, Catalogue, V, 1864, 373 (Essequibo).—EIGENMANN and EIGENMANN, Proc. U. S. Nat. Mus., XIV, 1891, 60.

Myleus rubripinnis EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 443.

Five specimens, 72–97 mm. Crab Falls. (C. M. Cat. No. 1121*a–b*; I. U. Cat. No. 11662.)

Six specimens, 124–365 mm. Crab Falls. (C. M. Cat. Nos. 1128 and 1129; I. U. Cat. No. 11657.)

Three specimens, 139–252 mm. Rockstone. (C. M. Cat. No. 2218; I. U. Cat. No. 11656.)

[58] **Mylophus schomburgki** (Jardine).

Tetragonopterus schomburgkii JARDINE, in Schomburgk, Fishes Brit. Guiana, I, 1841, 243, pl. 22 (Rio Negro).

Myletes schomburgkii (not of Müller and Troschel) CUVIER and VALENCIENNES, Hist. Nat. Poiss., XXII, 1848, 212 (Surinam).—STEINDACHNER, "Ichthyologische Beiträge," v, 1876, 86.—EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 443.

Myletes palometa CUVIER and VALENCIENNES, Hist. Nat. Poiss., XXII, 1848, 214 (Orinoco).—GÜNTHER, Catalogue, V, 1864, 372.

No specimens were secured and there is no authentic record of its having been taken in the Essequibo.

One specimen, 95 mm. Bartica. (C. M. Cat. No. 2223.)

One specimen, 157 mm. Malali. (C. M. Cat. No. 2222*a*.)

One specimen, 325 mm. Tumatumari. (I. U. Cat. No. 11658.)

Head 3.75; depth 1.28–1.4; D. 26–28; A. 36–44; serræ 33–41 + 4–8; scales 88 with pores. Eye 2.75 in the head, 2 in the interorbital.

All the specimens so far recorded have the anal falcate. The larger of the types in Berlin is but 120 mm. long.

248. **Myloplus asterias** (Müller and Troschel). (Plate LVII, fig. 3.)

Myletes asterias Müller and Troschel, Horæ Ichth., I, 1845, 36, pl. 10, fig. 2 (Essequibo and Mazaruni); in Schomburgk, Reisen, III, 1848, 638 (Essequibo and Mazaruni near cascades).—Günther, Catalogue, V, 1864, 373 (Essequibo).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 60.—Boulenger, Trans. Zool. Soc. London, XIV, 1896, 37 (Descalvados).

Myleus asterias Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 443.

Myletes ellipticus Günther, Catalogue, V, 1864, 375 (Essequibo).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 61.

Myleus ellipticus Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 443.

Two specimens, males, 212–190 mm. Malali. (C. M. Cat. No. 2217*a*; I. U. Cat. No. 11660*a*.)

Head 3.66; depth 1.5; D. 27; A. 35–39; serræ 44 + 8 double ones and 37 + 11; eighty-seven to eighty-nine scales with pores, about ten more rows of scales than indicated by pores; eye 2.6–2.75 in the head, 1.5–2 in the interorbital, .7 in the snout.

For the general characters of this species, see the figure. I have examined the type of *ellipticus* in the British Museum, and a specimen collected by Ehrhardt. The type is soft and faded, but the second specimen is in a good state of preservation. They are males.

Two specimens of *M. asterias* in the British Museum, as well as two (including the type) in the Berlin Museum, are females, and have the anal falcate.

249. **Myloplus rhomboidalis** (Cuvier). (Plate LVIII, figs. 1–4.)

Myletes rhomboidalis Cuvier, Mém. Mus. d'Hist. Nat., IV, 1818, 449, pl. 22, fig. 3.—Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 210.—Castelnau, Anim. Am. Sud, Poiss., 1855, 67 (Amazon).—Günther, Catalogue, V, 1864, 373 (Essequibo; Guiana).—Eigenmann and Eigenmann, Proc. U. S.

Nat. Mus., XIV, 1891, 60.—Ulrey, Ann. N. Y. Acad. Sci., VII, 1895, 299 (Brazil).

Myleus rhomboidalis Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 443.

Tetragonopterus latus Schomburgk, Fishes Brit. Guiana, I, 1841, 241.

Myletes latus Müller and Troschel, Horæ Ichth., I, 1845, 37; in Schomburgk, Reisen, III, 1848, 638 (all rivers).

One specimen, 20 mm. Konawaruk. (C. M. Cat. No. 2462*a*.)

Two specimens, 130–219 mm. Tumatumari. (C. M. Cat. No. 1490*a*; I. U. Cat. No. 11659.)

One specimen, 19 mm. Gluck Island. (C. M. Cat. No. 2463*a*.)

Seven specimens, the largest 47 mm. Warraputa. (C. M. Cat. No. 1103*a–c*; I. U. Cat. No. 11664.)

Eight specimens, the largest 40 mm. Amatuk. (C. M. Cat. No. 1105*a–b*; I. U. Cat. No. 11663.)

One specimen, 59 mm. Crab Falls. (C. M. Cat. No. 2221*a*.)

One specimen, about 104 mm. Bartica. (C. M. Cat. No. 2461.)

I have also examined the specimens in the British Museum, the largest of which is 260 mm., and those in the Berlin Museum under the head of *latus*.

Most of the specimens secured were young from the cataracts at Warraputa, Amatuk, and Crab Falls.

Head 3.66; depth 1.5; D. 23–24; A. 35 and 36; serræ 37–41; eye 2.75 in the head, 1.5 in the interorbital. Most readily distinguished by the short-rayed dorsal and long adipose dorsal.

Myleus Müller and Troschel.

Myleus Müller and Troschel, Horæ Ichth., I, 1845, 24 (*setiger* = *pacu*).

Tometes Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 226 (*trilobatus* = *pacu*).

Type, *Myleus setiger* Müller and Troschel = *Myletes pacu* Schomburgk.

Belly trenchant, serrate, the serræ becoming obscure with age; the two premaxillary series of teeth close together, the outer incisor-like; mandible with a pair of conical teeth in front; anal falcate in the female, bilobed in the male; dorsal rays prolonged into filaments in the male.

250. **Myleus pacu** (Schomburgk). (Plate LIX, figs. 1–6.)

Myletes pacu Schomburgk, Fishes Brit. Guiana, I, 1841, 236, pls. 20–21.—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 644.

Myleus setiger Müller and Troschel, Horæ Ichth., I, 1845, 39, pl. 11, fig. 1—1*h* (Essequibo; Santarem); in Schomburgk, Reisen, III, 1848, 638 (Essequibo below the cascades).—Eigenmann, Repts. Princeton Univ. Exp. Pagatonia, III, 1910, 443.

Myletes setiger Kner, "Familie der Characinen," ii, 1859, pl. 2, fig. 6 (Matto Grosso).—Günther, Catalogue, V, 1891, 378 (British Guiana).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 61.

Myletes schomburgkii (not of Jardine) Müller and Troschel, Horæ Ichth., I, 1845, 37.—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 637 (Rupununi; Takutu; Zuraima; Savannah swamps).—Günther, Catalogue, V, 1864, 372, part.—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 60.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 443.

Myletes divaricatus Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 215 (Essequibo).—Kner, "Familie der Characinen," ii, 1859, 15.—Günther, Catalogue, V, 1864, 376.

Myletes diodyxodon Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 222.—Castelnau, Anim. Am. Sud, Poiss., 1855, pl. 34, fig. 1 (Amazon).

Tometes trilobatus Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 226 (Cayenne).

Myletes trilobatus Günther, Catalogue, V, 1864, 377.—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 61.

Myletes filosus (*ex* Heckel, MS.) Kner, "Familie der Characinen," ii, 1859, 19.

Schomburgk preserved no specimen of his "Pacu" to serve as the type for this species. There is, however, no doubt about what fish he figured and described. Müller and Troschel, whose specimens I have examined, described the male of this species as *Myleus setiger* and referred the female to Schomburgk's *schomburgkii*, which is quite a different fish.

I have also examined the various types of Cuvier and Valenciennes. The type of *Myletes divaricatus* is undoubtedly, and that of *Tometes trilobatus* is very probably, also of this species. Both types are dried, *divaricatus* apparently a half skeleton while *trilobatus* is a stuffed skin. They may or may not have their original shape. The depth is 2 in the length without the snout in one, and 2 without the snout and eye in the other.

This is the most famous of the food-fishes of Guiana. It is abundant about the falls, where it feeds on the weeds growing on the rocks.

Four specimens, one female, 515 mm., and three males, 490–563 mm. Falls of the Mazaruni. Mr. Fowler. (C. M. Cat. Nos. 2491 and 2492.)

Fifteen specimens, 21–55 mm. Warraputa. (C. M. Cat. Nos. 1102*a–d* and 2220*a–d*; I. U. Cat. No. 11665.)

Head 3.8; depth 1.7–2; D. 23–25; A. 36–38; scales 43 to about 95–110–34 (the latter counted in a series above the lateral line); eye about 4.7 in the head; abdominal serræ 31 + 4.

Sides irregularly blotched with black in the adult.

The young specimens were taken with poison in one of the shutes of the Warraputa cataracts. It is probable therefore that the "Paeu" spawns above the cataracts.

Subfamily Cynodontinæ.

Cynodon Spix.

Cynodon Spix, Selecta Gen. et Spec. Pisc. Bras., 1829, 76 (*vulpinus* and *gibbus*). Type, *Cynodon gibbus* Spix.

This species may be recognized among its relatives by its elongate anal. A fantastic fish, the appearance of which suggests a "grafting" of two types, one type being represented from the head to behind the shoulder-girdle, the other from behind the shoulder-girdle to the tail.

This genus has not before been reported from Guiana.

251. **Cynodon gibbus** Spix.

Cynodon gibbus Spix, Selecta Gen. et Spec. Pisc. Bras., 1829, pl. 27.—Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 333 (Amazon).—Castelnau, Anim. Am. Sud, Poiss., 1885, 75 (Amazon).—Kner, "Familie der Characinen," ii, 1859, 46 (Rio Branco).—Günther, Catalogue, V, 1864, 359.—Cope, Proc. Am. Philos. Soc., XVII, 1878, 688 (Peruvian Amazon).—Steindachner, "Flussfische Südamerika's," iv, 1882, 15 (Rio Huallaga).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 59.—Perugia, Ann. Mus. Genova, (2), XVIII, 1897, 26 (Rio Mamoré).—Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 467.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 444.

Five specimens, 115–230 mm. Wismar. (C. M. Cat. Nos. 1249*a* and 1998*a–b*; I. U. Cat. No. 12245.)

Two specimens, 240–325 mm. Malali. (C. M. Cat. No. 1997*a*; I. U. Cat. No. 12246.)

Head 4.75–5; depth 3.4; D. 12; A. 77; scales 145–163 in a series above the lateral line. Eye 1 in snout, 3.8 in head, 1 in interorbital.

Compressed, breast trenchant; body deep at the pectorals, long, tapering to

the caudal; skull very short above, the profile depressed over the eyes; mouth very oblique; maxillary slipping under the suborbital; maxillary-premaxillary border three-fourths of the length of the head; gill-rakers short, tubercular, about eighteen on the lower arch.

Scales cycloid, very small along the back, becoming larger downward; basal half of anal scaled; caudal naked; lateral line straight.

Pectorals very large, wing-like; ventrals about one-fourth as long as the pectorals; anal very long, its margin straight, its origin equidistant from the angle of the mouth and the end of the anal; dorsal small, over the anterior part of the anal; caudal lunate, its middle rays prolonged. Iridescent silvery; a large black humeral spot.

Hydrolycus Müller and Troschel.

Hydrolycus Müller and Troschel, Horæ Ichth., I, 1845, 18.

Type, *Hydrocyon scomberoides* Cuvier.

Distinguished by its rounded caudal and short anal. Dorsal in advance of anal; anal and caudal scaled; scales with serrate margins.

Of the three species of this genus one is said to occur in all the rivers of Guiana. We did not secure specimens.

252. Hydrolycus scomberoides (Cuvier).

Hydrocyon scomberoides Cuvier, Mém. Mus. d'Hist. Nat., V, 1819, 357, pl. 27, fig. 2.

Hydrocynus scomberoides Cuvier, Règne Animal, II, 1817, 168.

Hydrolycus scomberoides Müller and Troschel, Horæ Ichth., I, 1848, 19, pl. 5, fig. 2; in Schomburgk, Reisen, III, 1848, 636 (all streams).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 59.—Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 466.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 444.

Cynodon scomberoides Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 324 (Essequibo).—Kner, "Familie der Characinen," ii, 1848, 45 (Bananeira).—Castelnau, Anim. Am. Sud, Poiss., 1855, 75, pl. 39, fig. 2 (Araguay; Lac de Jules).—Günther, Catalogue, V, 1864, 358 (River Capin, British Guiana).—Peters, MB. Akad. Wiss. Berlin, 1877, 472 (Calabozo).—Steindachner, "Flussfische Südamerika's," iv, 1882, 15 (Iquitos, Amazonas).

? *Hydroscion* ? *armatus* Schomburgk, Fishes Brit. Guiana, I, 1841, 247, pl. 25*bis*.[59]

[59] There are two plates marked 25. Only the second belongs to this species. The description evidently refers to this species.

Head 4.5; depth 3.5–4; D. 12; A. 33–40.

Similar to *Cynodon gibbus* in general appearance.

Although reported as occurring in all the rivers of Guiana no specimens of this species were seen. A specimen 228 mm. long in the British Museum was presented by Robert Schomburgk. Another over 500 mm. long is in the Berlin Museum. It would seem from these specimens that the caudal is slightly emarginate.

Mr. Ellis has recently taken one on Gluck Island.

Subfamily Characinæ.

Exodon Müller and Troschel.

Exodon Müller and Troschel, Horæ Ichth., I, 1845, 31 (*paradoxus*).

Hystricodon Günther, Catalogue, V, 1864, 549 (*paradoxus*).

Type, *Exodon paradoxus* Müller and Troschel.

Entire dorsal in front of the vertical from the anal; anal moderate; lateral line complete; teeth conical, in a double series in the mandible, those of the outer series largest, irregular, divergent; a pair of large tooth-like prongs extending forward on tip of snout.

253. **Exodon paradoxus** Müller and Troschel. (Plate LX, fig. 1.)

Exodon paradoxus Müller and Troschel, Horæ Ichth., I, 1845, 31, pl. 4, fig. 1 (Essequibo); in Schomburgk, Reisen, III, 1848, 635 (Upper Rupununi).—Kner, "Familie der Characinen," ii, 1859, 38 (Rio Branco).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 58.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 446.

Epicyrtus paradoxus Castelnau, Anim. Am. Sud, Poiss., 1855, 60 (Caixas; Araguay; Amazon).

Epicyrtus exodon Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 46.

Hystricodon paradoxus Günther, Catalogue, V, 1864, 349.

One specimen, 75 mm. Rupununi. (C. M. Cat. No. 2145.)

This species differs from all other characins in its large black spots on the side in front of the dorsal and covering the caudal peduncle.

Head 3.5; depth 2.75–3; D. 10 or 11; A. 19–22; scales 9–36–6. Eye 1 in snout, 3.5 in head, 1.5 in interorbital.

Dorsal and ventral profiles equally arched, without humps or depressions; ventral area rounded, without a distinct median series of scales; predorsal area rounded, with a median series of about eleven scales. Occipital process extending one-sixth of the way to the dorsal; fontanel reaching to above the middle of the eye;

second suborbital leaving a naked area between it and the maxillary, none between it and the limbs of the preopercle. Snout pointed, mouth little oblique, a distinct angle between the horizontal premaxillary and the maxillary; premaxillary-maxillary border half as long as the head; maxillary with about eight conical teeth along its entire anterior border, one of the teeth directed forward and outward; premaxillary with a forward directed process at its tip, an outer series of two and inner series of six subequal conical teeth, none of which are canines; lower jaw with an inner series of subequal, irregularly graduate teeth, and an outer series of four large conical teeth on each side, the second of which is directed forward as well as upward.

Gill-rakers 7 + 9, all but the lowermost one of the upper arch minute, those of the lower arch about one-fourth of the orbit.

Scales regularly imbricate, smallest on the breast, each with several longitudinal striæ; fins naked; lateral line decurved in front.

Origin of dorsal a little nearer to base of caudal than to tip of snout, its highest ray 4.5 in the length; caudal lobes about 3 in the length; anal emarginate, its origin nearer to caudal than to base of pectoral; ventrals reaching anal, pectorals to ventrals.

Upper parts and caudal bright yellow, a bright silvery band between the black spots, lower parts suffused with red; dorsal red in the middle, then yellow; an orange streak from base of first anal ray to the tip of the third or fourth; middle half of second and third ventral rays red. A large black spot covering more than thirty scales, its center over the ninth scale of the lateral line; a large black spot covering the entire sides of the caudal peduncle.

Rœboides Günther.

Rœboides Günther, Catalogue, V, 1864, 345 (*microlepis* and *guatemalensis*).—Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 57.

Rhœboides Berg, Com. Mus. Nac. Buenos Aires, 5, 1899, 94.

Cynocharax Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 457 (*affinis*).

Type, *Epicyrtus microlepis* Reinhardt.

Teeth all small, conical or tricuspid, in a single series on the maxillary and sides of the mandibles, in two imperfect series on the premaxillary and sometimes the front of the mandible; middle teeth of premaxillary slightly enlarged; maxillary with teeth along its entire margin or not; anterior teeth of the mandible and one on each corner slightly enlarged; several larger tooth-like prongs projecting forward from the upper jaw at the margin of the lip; maxillary frequently with

similar prongs; lower jaw with two or four prongs directed forward; cheeks almost entirely covered by the suborbitals; gill-membrane free from the isthmus; gill-rakers similar on the two limbs, strong, few, long; pharyngeals with short, stiff rakers; scales small, cycloid; dorsal over origin of anal, which is very long, of forty-two to fifty-seven rays; pectorals overlapping ventrals; breast flat; tongue free. Lateral line complete; alimentary canal short.

254. **Rœboides thurni** sp. nov. (Plate LX, fig. 2.)

Type, 104 mm. Rockstone sand-bank. (Carnegie Museum Catalog of Fishes No. 2149.)

Cotypes, four specimens, 45–115 mm. Rockstone sand-bank. (C. M. Cat. No. 2150*a–b*; I. U. Cat. No. 12320.)

Cotypes, nine specimens, 63–87 mm. Crab Falls. (C. M. Cat. No. 2151*a–d*; I. U. Cat. No. 12321.)

Head 3.6–3.75; depth 2.75–3.2; D. 11; A. 47–51, most frequently 48 or 49; scales 17 to 19–72 to 80–10 to 13; eye 1–1.3 in the snout, 3.3–4 in the head, 1 in the interorbital.

Elongate; profile oblique, nearly straight to base of the occipital process, then abruptly rising in an arch to the dorsal; preventral area rounded, without a regular median series of scales; post-ventral area with a median keel; predorsal area narrow, the median line in part naked; about thirty scales between the dorsal and the occipital crest; occipital crest reaching four-tenths of the way to the dorsal; fontanel reaching to above the anterior margin of the eye.

Opercles, suborbitals, and bones of the head wrinkled. Middle of opercle drawn out into a flat spine. Snout pointed, premaxillary horizontal, meeting the maxillary at an angle; premaxillary-maxillary border 2 in the head; maxillary with about eight stout conical teeth with divergent points; premaxillary with several conical thorns directed outward and forward, of which the anterior is the largest, also two irregular series of small conical teeth; lower jaw with thorns directed forward and outward and a single series of teeth, of which the sixth tooth is the largest, the first next in size and the remainder (about twenty) small, conical.

Gill-rakers 7 + 10.

Scales small, cycloid, without striæ. Fins naked; lateral line straight.

Origin of dorsal in advance of the middle, the fin small, the highest ray 4 in the length; caudal small, the lobes 4 in the length; anal very long, slightly emarginate, its origin equidistant from the snout and its end, a little nearer to the snout than to the dorsal; ventrals reaching anal; pectorals beyond the middle of the ventrals.

An intense black spot, about as large as the pupil, on the second to fourth or fifth row of scales above the lateral line, and from above the sixth to the ninth pore of the latter; a diffuse dark area at the end of the caudal peduncle; a silvery lateral band.

Charax Scopoli.

Charax Gronow, Mus. Ichth., I, 1754, 10 (containing the modern *Characinus gibbosus* and *Pœciluriehthys bimaculatus*).—Scopoli, Intr. Hist. Nat., 1777, 455.

Characinus Lacépède, Hist. Nat. Poiss., V, 1802, 269 (sp.).—Swainson, Class. Fishes, Amph., and Rept., II, 1829, 289 (*gibbosus*).—Gill, Proc. U. S. Nat. Mus., XVIII, 1895, 213 (*gibbosus*).

Epicyrtus Müller and Troschel, Horæ Ichth., I, 1845, 17 (*gibbosus*).

Anacyrtus Günther, Catalogue, V, 1864, 345 (*gibbosus* and *pauciradiatus*).

Type, *Salmo gibbosus* Linnæus.

Premaxillary with a feeble canine at each end and a double row of teeth between; lower jaw with two feeble canines and a series of conical teeth; anal very long; lateral line complete; fins naked; breast flat, bordered by the blade-like lower edges of the clavicles, which end in a spine in front and behind.

255. **Charax gibbosus** (Linnæus). (Plate LX, fig. 3.)

"Charax 53," Gronow, Mus. Ichth., I, 1754, 19, pl. 1, fig. 4; Zoophyl., 1763, 124, No. 380.

Salmo gibbosus Linnæus, Syst. Nat., ed. 10, I, 1758, 311, No. 19; ed. 12, I, 1766, 513 (Surinam).—Bloch and Schneider, Syst. Ichth., 1801, 419.

Epicyrtus gibbosus Müller and Troschel, Horæ Ichth., I, 1845, 17, pl. 2, fig. 1; in Schomburgk, Reisen, III, 1848, 635 (Lower Essequibo).

Cynopotamus gibbosus Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 321, pl. 645 (Maná; Essequibo; Amazon).—Castelnau, Anim. Am. Sud, Poiss., 1855, 75 (Amazon; Ucayale).—Garman, Bull. Essex Inst., XXII, 1890, 11 (Coary; Cudajas; Iça; Javary; Jutahy; Lake Hyamary; Manacapurú; Manaos; Obidos; Porto do Moz; Rio Negro; Silva, Lake Saraca; Surinam; Tabatinga).

Anacyrtus gibbosus Günther, Catalogue, V, 1864, 346 (Surinam; British Guiana).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 57.—Perugia, Ann. Mus. Genova, (2), X, viii, 1897, 26 (Rio Beni).

Charax gibbosus Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 453 (Surinam).—Eigenmann and Ogle, Proc. U. S. Nat. Mus., XXXIII, 1907, 32 (Guiana; Paraguay).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 444.

Epicyrtus macrolepis Kner, "Familie der Characinen," ii, 1859, 39, pl. 6, fig. 1 (Cujabá; Rio Paraguay; Irisanga).—Steindachner, "Fisch-fauna Magdalenen-Stromes," 1878, 46.—Boulenger, Trans. Zool. Soc. London, XIV, 1896, 36 (Descalvados).

Anacyrtus macrolepis Boulenger, Bull. Mus. Zool. ed Anat. Comp. Torino, XV, 1900, 948 (near Corumbá).

Characinus gibbosus Eigenmann and Kennedy, Proc. Acad. Nat. Sci. Phila., 1903, 525 (Arroyo Trementina).

Very abundant in lowlands.

Six hundred and thirty specimens, 35–135 mm. Botanic Garden. (C. M. Cat. No. 2124*a–x*; I. U. Cat. No. 12304.)

Seventy-two specimens, 38–134 mm. Georgetown trenches. (C. M. Cat. No. 2125*a–j*; I. U. Cat. No. 12305.)

Twenty specimens, 52–85 mm. Lama Stop-Off. (C. M. Cat. No. 2126*a–e*; I. U. Cat. No. 12306.)

Ten specimens, 50–88 mm. Creek in Mora Passage. (C. M. Cat. No. 2127-*a–e*; I. U. Cat. No. 12307.)

Six specimens, 60–103 mm. Issorora Rubber Plantation. (C. M. Cat. No. 2128*a–e*; I. U. Cat. No. 12308.)

Five specimens, 65–97 mm. Aruka River. (C. M. Cat. No. 2129*a–e*; I. U. Cat. No. 12309.)

Eleven specimens, 65–137 mm. Wismar. (C. M. Cat. No. 2130*a–f*; I. U. Cat. No. 12310.)

Twenty-nine specimens, 53–105 mm. Rockstone sand-bank. (C. M. Cat. No. 2131*a–e*; I. U. Cat. No. 12311.)

Fifty-two specimens, the largest 115 mm. Crab Falls. (C. M. Cat. No. 2132-*a–e*; I. U. Cat. No. 12312.)

One specimen, 72 mm. Tumatumari. (C. M. Cat. No. 2133.)

Two specimens, 59–68 mm. Konawaruk. (C. M. Cat. No. 2134*a*; I. U. Cat. No. 12113.)

Head 3.75–4; depth 2.6–3.75; D. 11; A. 48–56;[60] scales 16–53 to 60[61]–9; eye 1 in snout, 3.66 in head, 1 in interorbital in the adult; .75, 3, and .75 respectively in specimens 60 mm. long.

Compressed, elongate; breast flat, with a median series of scales; postventral

[60] Of eighteen specimens examined two have A. 48, one A. 49, one A. 50, five A. 51, three A. 52, one A. 53, three A. 54, one A. 55, and one A. 56.

[61] Of twenty-one specimens examined two have A. 53, one A. 54, two A. 55, two A. 56, four A. 57, three A. 58, three A. 59, and four A. 60.

area compressed; dorsal profile from dorsal to base of occipital process forming an arc of a circle whose center is near the origin of the anal; profile depressed over the eye, rising slightly forward, the lowest point in the profile nearly half an orbital diameter below the line joining the tip of the snout and the tip of the occipital process; mouth very oblique; maxillary extending to the end of the first suborbital; maxillary-premaxillary border two-thirds the length of the head; cheek very deep; a large part below the second suborbital naked; preopercle with a distinct angle.

Gill-rakers 6 + 8, strong, the longest about two-thirds the length of the eye.

Origin of dorsal a little nearer to tip of snout than to caudal, its height about 3.5 in the length; caudal small, its lobes 4 in the length; origin of anal in advance of the vertical from the origin of the dorsal, nearer to the tip of the snout than to the base of the last anal ray, its margin very slightly concave; ventrals reaching considerably beyond origin of anal; pectorals to about the middle of the ventrals.

Scales largest above the pectoral, becoming minute on the predorsal area; lateral line nearly straight; fins naked; no longitudinal striæ, scales with smooth edges.

A vertical, irregular humeral spot over the seventh or eighth scale of the lateral line; a triangular caudal spot, frequently very obscure.

256. **Charax rupununi** sp. nov.

Type, 58 mm. Rupununi. (Carnegie Museum Catalog of Fishes No. 2135.)

Cotypes, four specimens, 46–51 mm. Rupununi. (C. M. Cat. No. 2136*a*; I. U. Cat. No. 12814.)

Head 3.8; depth 3; D. 11; A. 46–48; scales 10–42 to 44–7; eye .7 in snout, 3 in head, .7 in interorbital.

Very similar to *C. gibbosus*, but the scales much larger; subpectoral blade of the clavicle prominent, its posterior spine extending to below the base of the last pectoral ray, its anterior spine claw-like, rising above the edge of the blade, directed upward, outward, and forward (simply forward in *gibbosus*), outer surface of the blade concave. Predorsal line naked (?).

A small black spot over the seventh scale of the lateral line; a deep-lying black vertical line at the base of the caudal rays, a black spot contiguous with it forward. Otherwise as in *C. gibbosus*.

ASIPHONICHTHYS Cope.

Type, *Asiphonichthys stenopterus* Cope.

This genus has all the characters of typical *Charax*, except that the lateral line is developed on a few anterior pores only.

257. **Asiphonichthys hemigrammus** sp. nov. (Plate LX, fig. 4.)

Type unique, 27 mm. Gluck Island. (Carnegie Museum Catalog of Fishes No. 2137.)

A second specimen was collected by Dr. Ellis on Gluck Island.

Head 3.5; depth 3; D. 10; A. 45; scales 10–48–7, five scales with pores; eye .75 in snout, 3 in head, .75 in interorbital.

Compressed, snout pointed, profile depressed over the eyes; maxillary extending to end of first suborbital; nearly the entire lower half of the cheeks naked; gill-rakers 5 + 8, those of the upper arch short, those of the lower large and long.

Scales without longitudinal striæ, fins naked; scales reduced in size on the back in front of the dorsal.

Anterior spine of the clavicle claw-like, directed upward and forward; the posterior spine scale-like; pectoral without developed rays; origin of dorsal very little nearer to tip of snout than to caudal, behind the vertical from the origin of the anal; ventrals reaching to the base of the eighth anal ray.

A black spot above and behind the last pore of the lateral line; a spot on the end of the caudal peduncle.

In the two specimens mentioned above the pectoral is without developed rays. In a third specimen, probably belonging to this species (38 mm.), the pectorals are normally developed.

CYNOPOTAMUS Cuvier and Valenciennes.

Cynopotamus CUVIER and VALENCIENNES, Hist. Nat. Poiss., XXII, 1848, 317.
Cyrtocharax FOWLER, Proc. Acad. Nat. Sci. Phila., 1906, 454.

Type, *Hydrocyon argenteus* Valenciennes.

Teeth of lower jaw in a single series, consisting of four canines in front (of which the third is largest) and numerous small teeth on the sides; premaxillary teeth in two series, a canine at each end; maxillary without canines. Lateral line complete, scales very small. No opercular spine. Clavicle slightly notched, the lower edge not blade-like, without spines.

I have examined the type of *Cynopotamus argenteus* (22 mm. long, Buenos Aires) in the Jardin des Plantes. I was unable to find an inner series of teeth in the lower jaw.

258. **Cynopotamus essequibensis** sp. nov.

Type, one specimen, 175 mm. Potaro Landing. (C. M. Cat. No. 2146.)

Cotype, one specimen, 180 mm. Tumatumari. (C. M. Cat. No. 2147.)

Cotypes, seven specimens, 53–170 mm. Rockstone. (C. M. Cat. No. 2148-*a–c*; I. U. Cat. No. 12319.)

Head 3.66–3.75; depth 3; D. 11; A. 42–47; scales 19–91 to 98–15; eye 1 in the snout, 3.33 in the head, 1 in the interorbital.

Compressed, tail slender, predorsal region of the body heavy; predorsal profile arched to the occipital process, depressed over the eyes; preventral area rounded, with many small scales; postventral area broad but with a trenchant median keel; predorsal area rounded, entirely scaled. Fontanel reaching to above anterior margin of the pupil; mouth large, premaxillary-maxillary border without an angle, 1.33–1.4 in the length of the head; maxillary extending far beyond the first suborbital; second suborbital leaving a wide naked margin below.

Maxillary with about sixty minute teeth, the uppermost ones largest, but no canines; premaxillary with an outer series of about ten teeth, of which the first and last are large canines, an inner series of two small canines opposite the fifth and seventh teeth of the outer series; each ramus of the lower jaw with four canines in front, of these the second is the smallest, the third much the largest, the first and fourth of about the same size, and about thirty graduated conical teeth on the sides.

Gill-rakers 2 + 6, the middle one heavy, half as long as the eye.

Scales largest about the origin of the lateral line, decreasing most rapidly to in front of the dorsal; about forty rows of scales in front of the dorsal; fins naked; lateral line almost straight; surface of each scale with numerous denticles (as many as one hundred on the largest scales of one of the larger specimens) arranged in more or less regular series.

Dorsal pointed, its origin in front of the middle, its height 4 in the length; caudal lobes short, 4.5 in the length; anal slightly emarginate in front, the origin and the middle of the dorsal equidistant from the snout, a little nearer to base of middle caudal rays than to tip of snout; ventrals reaching the anal in the young, falling short of it in the adult; pectoral reaching beyond origin of ventrals.

A silvery lateral band; a dusky circular caudal spot at the end of the caudal peduncle; a large conspicuous triangular humeral spot, its base just above the fifth to the ninth scales of the lateral line, its apex on about the seventh row of scales above the lateral line.

Acanthocharax[62] gen. nov.

Type, *Acanthocharax microlepis* sp. nov.

Lateral line complete; origin of anal under the dorsal; scales moderate, cycloid; a strong spine on the angle of the preoperele, continuous with the margin of the lower limb; a small canine at the upper end of the maxillary, its margin with

[62] ἄκανθα, a thorn; χάραξ, name of the typical genus.

conical teeth to its tip; a strong canine at each end of the premaxillary, and two series of conical teeth between them; four graduated canines on the lower jaw in front, the last being much the largest, these followed on the sides by a series of about thirty graduated conical teeth; predorsal area naked.

259. **Acanthocharax microlepis** sp. nov. (Plate LXI, fig. 1.)

Type, 105 mm. Tumatumari. (Carnegie Museum Catalog of Fishes No. 2138.)

Cotypes, forty-three specimens, 55–103 mm. Tumatumari. (C. M. Cat. No. 2139*a–j*; I. U. Cat. No. 12315.)

Cotypes, three specimens, 48–85 mm. Crab Falls. (C. M. Cat. No. 2140-*a–b*; I. U. Cat. No. 12316.)

Cotypes, twenty-two specimens, 51–82 mm. Rockstone. (C. M. Cat. No. 2141*a–c*; I. U. Cat. No. 12317.)

Head 3.4–3.66; depth 2.7–2.8; D. 11; A. 30–34; scales 9–47 to 53–6; eye .75 in snout, 2.75 in head, .66 in interorbital.

Compressed, head and shoulders heavy, profile depressed over the eye, arched from base of the occipital process to the dorsal; preventral area rounded; a deep notch in the clavicle for the reception of the pectoral, the process below the pectoral broad-tipped behind, no free spine in front; postventral area trenchant, a wide naked area below the second suborbital; mouth oblique, the maxillary extending beyond the first suborbital; distance from tip of snout to end of maxillary equal to distance from tip of snout to posterior margin of the eye; gill-rakers 5 + 9, the longest .4 of the eye.

Scales very regularly imbricate, except on the breast, without longitudinal striæ. A naked area beginning at the dorsal, widening forward and extending on either side of the occipital process; fins naked; lateral line decurved, complete.

Origin of the dorsal nearer the snout than to the tail; origin of anal and middle of dorsal nearly equidistant from the snout; anal distinctly emarginate; ventrals reaching anal, pectorals to near middle of ventrals.

A humeral spot over the fourth to sixth scale of the lateral line; a large, diffuse caudal spot.

HETEROCHARAX gen. nov.

Type, *Heterocharax macrolepis* sp. nov.

Lateral line complete; origin of anal under the dorsal; scales moderate, cycloid; a spine on the lower angle of the preopercle; maxillary without a canine, the teeth graduated in both directions from the fifth; premaxillary with a single

series of teeth; several of those near the anterior end are canines, of which the third from the end is largest. Sides of lower jaw with minute teeth, a large conical tooth at the outer corner of the jaw, followed forward by four teeth decreasing in size, the median tooth again a large canine; predorsal area scaled.

260. **Heterocharax macrolepis** sp. nov. (Plate LXI, fig. 2.)

Type, 46 mm. to base of caudal. Rockstone. (Carnegie Museum Catalog of Fishes No. 2142.)

Cotypes, three specimens, 38–42 mm. Rockstone. (C. M. Cat. No. 2143*a*; I. U. Cat. No. 12318.)

Cotype, one specimen, 37 mm. Wismar. (C. M. Cat. No. 2144*a*.)

Head 3.6–3.9; depth 2.75–3; D. 10 or 11; A. 37 or 38 (or 42 in the Wismar specimen); scales 6 or 7–37 to 40–5; eye .5 in snout, 2.3 in head, .5 in interorbital.

Slender, profile without notable hump or depression; occipital process extending less than one-fourth the distance to the dorsal; preventral area flat, postventral area trenchant; maxillary not reaching to the end of the first suborbital; cheeks entirely covered by the second suborbital; distance from tip of snout to end of maxillary equal to distance from tip of snout to middle of eye. Gill-rakers 7 + 12.

Scales regularly imbricate, not notably decreased toward the predorsal area; a median series of about nine scales in front of the dorsal; about two pairs of scales between the occipital process and the median series; scales with from two to seven radiating striæ. Fins naked.

Origin of dorsal equidistant from snout and caudal; highest dorsal ray 4 in the length; origin of anal a little farther from snout than origin of the dorsal; ventrals reaching anal; pectorals to the ventrals.

Silvery, without distinct spots. A dark streak along the sides and along base of anal.

Subfamily Acestrorhynchinæ.

Acestrorhynchus Eigenmann.

Xiphorhynchus Agassiz, Selecta Gen. et Spec. Pisc. Bras., 1829, 76 (*falcatus*).
Xiphorhamphus Müller and Troschel, Horæ Ichth., I, 1845, 17 (*falcatus*).
Acestrorhynchus Eigenmann, Smiths. Misc. Coll., Quarterly Issue, XLV, 1903, 146 (*falcatus*).

The name *Xiphorhynchus* is preoccupied by Swainson's genus of birds, proposed in 1827. *Xiphorhamphus* is preoccupied by Blyth's genus of birds in 1843.

Type, *Salmo falcatus* Bloch.

Premaxillary horizontal, its teeth strictly conical, in a single series, the second (or first) tooth and the next to the last strong, sharp, canine; anterior upper part of maxillary little oblique, with teeth similar to those of the premaxillary, the first and fourth or fifth being canines; the posterior part of the maxillary abruptly much oblique, with the exception of the teeth entirely concealed by the first suborbital when the mouth is closed; back part of mandible with minute, recurved teeth, preceded by three widely spaced canines, the middle one largest.

Pectorals not overlapping the far remote ventrals; scales cycloid; lateral line complete; tongue long and free.

KEY TO THE GUIANA SPECIES OF ACESTRORHYNCHUS.

a. A conspicuous vertical black humeral blotch; caudal spot small and circular, or larger and continued on the middle caudal rays. Lateral line 79–95; A. 25–29. ..... **falcatus.**

aa. Shoulder-girdle with a minute spot in front of the origin of the lateral line; anal long, with 28–33 rays. Lateral line 93–114. ..... **microlepis.**

aaa. No shoulder-spot, opercle margined with dark; A. 23–26. Lateral line 144–152. ..... **falcirostris.**

aaaa. A black band from the tip of the snout to the caudal; A. 27; scales 79, eight between lateral line and anal. **nasutus.**

261. **Acestrorhynchus falcatus** (Bloch). (Plate LXI, fig. 3.)

Salmo falcatus BLOCH, Ausl. Fische, VIII, 1794, 120, pl. 385 (Surinam).

Xiphorhynchus falcatus CUVIER and VALENCIENNES, Hist. Nat. Poiss., XXII, 1848, 337, part (Surinam).—CASTELNAU, Anim. Am. Sud, Poiss., 1855, 75 (Amazon).

Xiphorhamphus falcatus MÜLLER and TROSCHEL, Horæ Ichth., I, 1845, 17; in Schomburgk, Reisen, III, 1848, 635 (Essequibo; Pomeroon).—GÜNTHER, Catalogue, V, 1864, 354.—VAILLANT, Bull. Mus. d'Hist. Nat., V, 1899, 154 (Carsevenne).

Acestrorhynchus falcatus EIGENMANN and OGLE, Proc. U. S. Nat. Mus., XXXIII, 1907, 34 (Surinam).—EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 447.

Xiphorhamphus ferox GÜNTHER, Ann. and Mag. Nat. Hist., (3), XII, 1863, 443 (Essequibo); Catalogue, V, 1864, 355 (Essequibo).

One specimen, 182 mm. Barima. (C. M. Cat. No. 1960.)

One specimen, 270 mm. Lama Stop-Off. (C. M. Cat. No. 1995.)

Nine specimens, 96–120 mm. Lama Stop-Off. (C. M. Cat. No. 1964*a–c*; I. U. Cat. No. 12232.)

Two specimens, 102–111 mm. Malali. (C. M. Cat. No. 1965*a*; I. U. Cat. No. 12242.)

Eleven specimens, 85–114 mm. Maduni Creek. (C. M. Cat. No. 1966*a–c*; I. U. Cat. No. 12233.)

Three specimens, 96–119 mm. Amatuk. (C. M. Cat. No. 1967*a*; I. U. Cat. No. 12234.)

One specimen, 152 mm. Tukeit. (C. M. Cat. No. 1968*a*.)

Two specimens, 110–122 mm. Christianburg. (C. M. Cat. No. 1969*a*; I. U. Cat. No. 12235.)

One specimen, 85 mm. Erukin. (C. M. Cat. No. 2456.)

One specimen, 133 mm. Konawaruk. (C. M. Cat. No. 1970*a*.)

One specimen, 136 mm. Wismar. (C. M. Cat. No. 1971*a*.)

One specimen, 155 mm. to base of caudal. Potaro Landing. (C. M. Cat. No. 1972*a*.)

Two specimens, 118–121 mm. Below Packeoo Falls. (C. M. Cat. No. 1973*a*; I. U. Cat. No. 12236.)

One specimen, 132 mm. Gluck Island. (C. M. Cat. No. 1974*a*.)

Head 3.5; depth 4.5–5; D. 11; A. 25 in two specimens, 26 in three, 27 in nine, 28 in six, 29 in two. Scales usually 87–89, but ranging from 79–95.[63] Eye 4.8 in snout, 4–4.5 in head, 1.3–1.5 in interorbital.

This species, very similar to *A. microlepis*, can readily be distinguished from the other species found in Guiana by the very large humeral blotch. The caudal spot is small, well-defined, and circular, confined to the base of the caudal rays in the specimens from Barima, Lama Stop-Off, and Maduni Creek, *i. e.*, in those from the tidal area. In specimens from the interior the humeral spot increases in size, and the caudal spot also becomes larger and more diffuse, extending on the caudal peduncle and frequently to the end of the middle caudal rays.

The specimens from Lama Stop-Off had the middle of the dorsal orange, two intense orange bands fading out backward on either side of the caudal spot, and a yellow band out from the caudal spot and around it; adipose yellowish.

262. **Acestrorhynchus microlepis** (Schomburgk).

Hydrocyon microlepis Schomburgk, Fishes Brit. Guiana, I, 1841, 247 (Rio Negro; Rio Branco; Essequibo).

Xiphorhamphus microlepis Müller and Troschel, Horæ Ichth., I, 1845, 18; in Schomburgk, Reisen, III, 1848, 636 (Cameroon; Upper Essequibo; Rupununi; Takutu).—Günther, Catalogue, V, 1864, 355 (Essequibo; British Guiana).—Steindachner, "Flussfische Südamerika's," iv, 1882, 14 (Huallaga; Iquitos; Amazons).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 58.

[63] All the specimens but one from Amatuk with fewer than 87 rays. The scales as far so examined are 79 in one, 80 in one, 82 in one, 83 in two, 87 in six, 88 in five, 89 in four, 90 in two, 91 in one, 93 in one, and 95 in one.

Acestrorhynchus microlepis EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 447.

I have examined a specimen in the Berlin Museum and:

Seventeen specimens, 86–222 mm. Crab Falls. (C. M. Cat. No. 1975*a–c*; I. U. Cat. No. 12223.)

One specimen, 148 mm. Creek below Potaro Landing. (C. M. Cat. No. 1976*a*.)

Four specimens, 99–146 mm. Malali. (C. M. Cat. No. 1977*a*; I. U. Cat. No. 12336.)

Six specimens, 106–107 mm. Botanic Gardens. (C. M. Cat. No. 1988*a–c*; I. U. Cat. No. 12224.)

Five specimens, 90–156 mm. Maduni Creek. (C. M. Cat. No. 1979*a–b*; I. U. Cat. No. 12225.)

Three specimens, 116–134 mm. Georgetown trenches. (C. M. Cat. No. 1980*a–b*; I. U. Cat. No. 12226.)

Two specimens, 86–110 mm. Wismar. (C. M. Cat. No. 1981*a*; I. U. Cat. No. 12227.)

One specimen, 47 mm. Erukin. (C. M. Cat. No. 1982*a*.)

Ten specimens, 104–162 mm. Tumatumari. (C. M. Cat. No. 1983*a–c*; I. U. Cat. No. 12228.)

Seventeen specimens, 74–168 mm. Rockstone sand-bank. (C. M. Cat. No. 1984*a–c*; I. U. Cat. No. 12229.)

Three specimens, 207–270 mm. Lama Stop-Off. (C. M. Cat. No. 1985*a–b*; I. U. Cat. No. 12230.)

One specimen, 200 mm. Issorora Rubber Plantation. (C. M. Cat. No. 1986*a*.)

Five specimens, 85–242 mm. Konawaruk. (C. M. Cat. No. 1887*a–d*; I. U. Cat. No. 12231.)

Head 3.4–3.8; depth 5–6.5; D. 11; A. 28–33, most frequently 32 or 33; scales 93–95 in specimens from the Georgetown trenches, 113–114 in those from Crab Falls, and 101–105 in those from Lama Stop-Off; eye 1.8 in the snout, 4.5 in the head, 1.1 in the interorbital; 1.7, 4, .7, respectively in the young.

Readily distinguished by a small black spot on the shoulder-girdle in front of the origin of the lateral line; a circular caudal spot. Dorsal, upper caudal lobe, and adipose orange; lower caudal band yellow in the specimens from Maduni.

Dr. Ellis took one specimen in brackish water at Georgetown.

263. Acestrorhynchus falcirostris (Cuvier).

Hydrocyon falcirostris Cuvier, Mém. Mus. d'Hist. Nat., V, 1819, 361, pl. 27, fig. 3.

Xiphorhynchus falcirostris Agassiz, Selecta Gen. et Spec. Pisc. Bras., 1829, 76.

Xiphorhamphus falcirostris Müller and Troschel, Horæ Ichth., I, 1845, 18.—Kner, "Familie der Characinen," ii, 1859, 50 (Matto Grosso).—Günther, Catalogue, V, 1864, 354 (Demerara; River Cupai); Proc. Zool. Soc. London, 1868, 247 (Xeberos; Pebas).—Cope, Proc. Am. Philos. Soc., XVII, 1878, 688 (Peruvian Amazon).—Steindachner, "Flussfische Südamerika's," iv, 1882, 15 (Huallaga).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 58.

Acestrorhynchus falcirostris Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 462.—Eigenmann and Ogle, Proc. U. S. Nat. Mus., XXXIII, 1907, 35.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 447.

Hydrocyon armatus Schomburgk, Fishes Brit. Guiana, I, 1841, pl. 25, not descr.

One specimen, 140 mm. Malali. (C. M. Cat. No. 1909*a*.)

Four specimens, 157–357 mm. Malali. (C. M. Cat. No. 1996*a–b*; I. U. Cat. No. 12337.)

Two specimens, about 170 mm. Twoca Pan. (C. M. Cat. No. 1978*a*; I. U. Cat. No. 12237.)

Two specimens, 335–342 mm. Maduni Creek. (C. M. Cat. No. 1990*a*; I. U. Cat. No. 12238.)

One specimen, 205 mm. Wismar. (C. M. Cat. No. 1991*a*.)

Twelve specimens, 150–340 mm. Rockstone. (C. M. Cat. No. 1992*a–c*; I. U. Cat. No. 12239.)

Two specimens, 270–315 mm. Lama Stop-Off. (C. M. Cat. No. 1993*a*; I. U. Cat. No. 12240.)

Two specimens, 237–238 mm. Konawaruk. (C. M. Cat. No. 1994*a*; I. U. Cat. No. 12241.)

Head 3.33–3.6; depth 6–7; D. 11; A. 22–26; lateral line 144–152, sixteen scales between lateral line and origin of anal. Eye 2–2.25 in the snout, 5–5.5 in the head, 1–1.5 in the interorbital.

Fontanel not extending forward to middle of eye.

No shoulder-spot; a small, circular, well-defined, intense black caudal spot; upper part of opercle blackish; pectoral and caudal yellowish in life, the middle caudal rays red to orange.

264. **Acestrorhynchus nasutus** sp. nov. (Plate LXI, fig. 4.)

Type unique, 79 mm. Rockstone. (Carnegie Museum Catalog of Fishes No. 1959.)

Distinguished by its long soft-tipped snout, short frontal fontanel, lateral bands, long head, etc.

Head 3.1; depth 6; D. 11; A. 27; scales 79, eight between lateral line and anal; eye 2.33 in the snout, 3.7 in the head, .7 in the interorbital.

Frontal fontanel very short, not reaching forward to above middle of eye; tip of snout soft.

A dark stripe from the tip of the snout to the end of the middle caudal rays; no humeral spot; a distinct enlargement of the band into a caudal spot; a second dark band from the end of the anal forward to above the space between the anal and ventrals.

Subfamily Hydrocyninæ.

Hydrocynus Cuvier.

Hydrocynus Cuvier, Règne Animal, II, 1817, 167.

Xiphostoma Spix, Selecta Gen. et Spec. Pisc. Bras., 1829, 78, pl. 42.

Type, *Hydrocynus lucius* Cuvier.

Lepidosteus-like Characins, the snout prolonged into a beak; each jaw with a series of minute conical teeth; dorsal in posterior half of the body; scales denticulate on the margin; lateral line complete.

One of the four species of the genus is locally abundant in Guiana.

265. **Hydrocynus cuvieri** (Agassiz).

Xiphostoma cuvieri Agassiz, Selecta Gen. et Spec. Pisc. Bras., 1829, 78, pl. 42.—Müller and Troschel, Horæ Ichth., I, 1845, 20, pl. 3, fig. 3 (Brazil and Guiana).—Cuvier and Valenciennes, Hist. Nat. Poiss., XXII, 1848, 355 (Amazon).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 636 (Upper Essequibo, Takutu; Rupununi).—Kner, "Familie der Characinen," ii, 1859, pl. 8, fig. 17 (Marabitanos).—Günther, Catalogue, V, 1864, 357.—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 59.—Pellegrin, Bull. Mus. d'Hist. Nat., V, 1899, 157 (Apuré).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 446.

Xiphostoma ocellatum Schomburgk, Fishes Brit. Guiana, I, 1841, 245, pl. 18 (Essequibo; Rios Negro and Branco).

Xiphostoma oseryi Castelnau, Anim. Am. Sud, Poiss., 1855, 76, pl. 40, fig. 1 (Tocantins).

I have examined the specimen figured by Müller and Troschel and:

Twenty-eight specimens, 120–200 mm., and one about 340 mm. Rockstone sand-bank. (C. M. Cat. Nos. 1115*a* and 1996*a–g*; I. U. Cat. No. 12244.)

One specimen, 500 mm. Rupununi. (C. M. Cat. No. 2464.)

Head 2.8–3.42; depth 6.5–7.5; D. 10; A. 10 or 11; V. 9; P. 30; scales 12–100 to 108–8; eye 4.3–5 in snout, 8–8.5 in head, 1.5–1.75 in interorbital.

Elongate, snout and lower jaw greatly prolonged into a slender pointed beak; upper jaw ending in a fleshy or cartilaginous tip more than half as long as the eye. Profile from dorsal to tip of snout nearly straight and horizontal; parietals with a zigzag suture; no fontanel; snout considerably more than half the length of the head; teeth minute, very numerous, in a single series in each jaw. Maxillary meeting the premaxillary at a distinct angle, ankylosed with it; cheeks with a very narrow naked border below the suborbitals in the young, entirely covered in the old; gill-rakers about twelve on the lower arch, very small, the anterior ones reduced to imbedded tubercles.

Dorsal nearer to ventrals than to anal, narrowly rounded or obliquely truncate; caudal forked, the lobes not more than twice the length of the middle rays, sometimes shorter; anal emarginate in the adult, the anterior rays reaching tip of last ray, the last three or four rays prolonged, the third from the last sometimes reaching the caudal; ventrals small, truncate or emarginate, reaching about half-way to anal; pectorals very broad, the inner rays minute, the outer 2.2–2.5 in the distance to the ventrals.

Lateral line nearly straight, not continued on the basal scales of the caudal; scales regularly imbricate, with numerous irregular striæ and denticulate margins in the adult. Fins naked.

A lateral band in the young, narrow and distinct from the eye to the opercle, broader and less regular on the sides; back irregularly spotted; outer margins of upper and lower caudal lobe, and anterior margin of anal light, the rest of the fins blackish; dorsal, ventrals, and pectorals hyaline; a small black ocellus at the base of the middle caudal rays. These markings, with the exception of the caudal ocellus, are less distinct in the adult.

Subfamily Erythrininæ.

Hoplias Gill.

Macrodon Müller and Troschel, Horæ Ichth., III, 1842, 6.

Hoplias Gill, Proc. U. S. Nat. Mus., XXVI, 1903, 1015.

Type, *Esox malabaricus* Bloch.

The name *Macrodon* is preoccupied.

Caudal rounded; no occipital process; no fontanel; no adipose; mouth large; cheeks entirely covered by the suborbitals; teeth all conical; maxillary with a canine and numerous small teeth; premaxillary with a large canine near the symphysis, a smaller one toward the sides, and numerous conical teeth; palatines with patches of teeth, the outer series enlarged; a detached patch of teeth in front of the palatines; mouth large, maxillary extending beyond the orbit; walls of the air-bladder normal. Supratemporal plate single.

266. **Hoplias macrophthalmus** (Pellegrin). (Plate LXII, fig. 1.)

"Aimara."

Erythrinus macrodon (not of Agassiz) Schomburgk, Fishes Brit. Guiana, I, 1841, 41 (all rivers).

Macrodon malabaricus macrophthalmus Pellegrin, Bull. Mus. d'Hist. Nat., XIII, 1907, 26 (Cayenne).

Macrodon trahira (not of Spix) Müller and Troschel, in Schomburgk, Reisen, III, 1848, 632 (all streams, especially near cascades).

Hoplias malabaricus microphthalmus Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 448.

Six specimens, 85–410 mm. Wismar. (C. M. Cat. No. 2173*a–c*; I. U. Cat. No. 12338*a–c*.)

One specimen, 191 mm. Creek below Potaro Landing. (C. M. Cat. No. 2174*a*.)

Two specimens, 401–460 mm. Maripieru Creek. (C. M. Cat. No. 2175*a*; I. U. Cat. No. 12339.)

A head, 114 mm. long. Tumatumari. (I. U. Cat. No. 12340.)

A head, 152 mm. long. Creek above Rockstone. (C. M. Cat. No. 2176.)

Three specimens, 94, 95, and 260 mm. Tukeit. (C. M. Cat. Nos. 2177*a* and 2230*a*; I. U. Cat. No. 12341.)

Three specimens, 85–87 mm. Malali. (C. M. Cat. No. 2178*a–b*; I. U. Cat. No. 12342.)

There is also a specimen in the Berlin Museum collected by Kappler in Surinam.

The specimen represented by the head from Rockstone was about 500 mm. long. I was told that specimens twice as large are taken in the creeks (which are really good-sized rivers) emptying into the Essequibo River above Rockstone. Schomburgk says they reach a size of four feet. No specimens were taken nearer the coast than Rockstone and Wismar. It is one of the most highly esteemed of the fishes.

Eye 6.5 in the head in a specimen about 500 mm., 5 in specimens 300–400 mm., 4 in specimens 50–250 mm.; 2 in the interorbital in the largest, 1.4 in specimens 300–400 mm.; .6 in specimens 50–150 mm.

Head 3–3.25 in the length measured to the end of the last scale on the caudal; depth 4–4.3; D. 15, rarely 16; A. 10; scales 43–45; thirteen, rarely fourteen, scales from lateral line to lateral line across the back in front of the dorsal.

Elongate, subcylindrical, the head pointed; mouth large, the lips meeting so as to obscure their sinuate margin; maxillary-premaxillary border about half the length of the head, the maxillary slipping under the prolonged first suborbital; cheeks entirely covered by the first suborbital, which is continued back to the vertical limb of the preopercle, and the second and third suborbitals above it; origin of dorsal 1.5 orbital diameters nearer to the snout than to the base of the middle caudal rays, its margin broadly rounded, the highest rays a little over half the length of the head, its base one-half its distance from the end of the lateral line; caudal equal to the length of the head less the opercle; anal pointed, scarcely reaching the caudal; ventrals rounded, inserted a little in advance of the middle of the dorsal, shorter than the caudal, equal to the pectorals.

Scales cycloid, regularly imbricate, nowhere specially increased or decreased in size; fins naked; lateral line straight, axillary scale very small. Tubes of the lateral line well-developed, multiple in the larger specimens.

Lower jaw mottled; a dark bar from the eye to the angle of the preopercle, another running straight back, expanding on the opercle; frequently a spot in the membrane behind the tip of the subopercle. Four horizontally V-shaped cross-bars, the widest down from the front part and from in front of the dorsal; the second and third from spots on the back behind the dorsal and the last from the base of the upper caudal rays; dorsal with five rows of spots or with five broad dark bands; caudal similar; anal and upper surface of ventrals and pectorals each with four or five bars and some spots.

267. **Hoplias malabaricus** Bloch. (Plate LXII, fig. 2.)

"Tareira" Marcgrave, Hist. Rer. Nat. Bras., IV, 1648, 157.

Esox malabaricus Bloch, Ausl. Fische, VIII, 1794, 149, pl. 392.

Synodus malabaricus Bloch and Schneider, Syst. Ichth., 1801, 397.

Macrodon malabaricus Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), II, 1889, 102 (Pará; Gurupa; Villa Bella; Avary; Montalegre; Arary; Porto do Moz; Obidos; Lago Alexo; Tonantins; Manaos; Tapajos; Santarem; Cudajas; Hyanuary; Manacapurú; Rio Negro; Silva, Lake Saraca; Teffé;

Hyavary; Rio Negro, near Lago Alexo; Itabapuana; Tabatinga; Jutahy; Lago Maximo; Iça; Tajapurú; Manes; Jatuarana; Lago Iuparana; Serpa; Campos; Barra de Pirahy; Rio Parahyba; Paraguay; Ueranduba; Surinam; Rio das Velhas; Rio San Francisco; Bon Jardin, Rio San Francisco; Rio Doce; Bahia; Santa Cruz; Santa Clara; Rio Mucury; São Matheos; Rio San Antonio; Rio Janeiro; Goyaz; San Gonçallo; Jequitinhonha; Rio Puty; Buenos Ayres; Rio Grande; Porto Alegre; Rio Arassuahy, Minas Geraes; Muriahé; Guiana; Rio Ipojuco, Province Pernambuco).—Eigenmann, Ann. N. Y. Acad. Sci., VII, 1894, 633 (Rio Grande do Sul).—Lahille, Rev. Mus. la Plata, VI, 1895, 7 (Arroyo del Gato; Arroyo de Dona Flora; Dock Central).—Vaillant, Bull. Mus. d'Hist. Nat., III, 1897, 221 (Chagres); V, 1899, 154 (Carsevenne; Carnot).—Eigenmann and Norris, Rev. Mus. Paulista, IV, 1900, 355 (Rio Tieté).—Pellegrin, Bull. Mus. d'Hist. Nat., V, 1899, 157 (Apuré).

Hoplias malabaricus Eigenmann and Kennedy, Proc. Acad. Nat. Sci. Phila., 1903 508 (Rio Branco; Arroyo Trementina; Arroyo Chogolalina; Estancia La Armonia, Arroyo Carrumbez).—Evermann and Kendall, Proc. U. S. Nat. Mus., XXXI, 1906, 78.—Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 293 (Ambyiacu, Peruvian Amazon; Rio Grande do Sul; Bahia; Rio das Velhas; Surinam).—Eigenmann and Ogle, Proc. U. S. Nat. Mus., XXXIII, 1907, 36 (Brazil; Trinidad; Truando; Lagoa Santa).—Eigenmann, Ann. Carnegie Mus., IV, 1907, 124 (Corumbá; Bahia Negra); Proc. Wash. Acad. Sci., VIII, 1907, 452 (Buenos Aires); Repts. Princeton Univ. Exp. Patagonia, III, 1910, 448.

Synodus tarcira Bloch and Schneider, Syst. Ichth., 1801, 398, pl. 79.

Macrodon tarcira Cuvier and Valenciennes, Hist. Nat. Poiss., XIX, 1846, 508 (Bahia; San Francisco; Amazon; Maracaibo).

Synodus palustris Bloch and Schneider, Syst. Ichth., 1801, 398.

Erythrinus trahira Spix, Selecta Gen. et Spec. Pisc. Bras., 1829, pl. 18.—Castelnau, Anim. Am. Sud, Poiss., 1856, 56 (Bahia).

Macrodon trahira Günther, Catalogue, V, 1864, 281 (Demerara; Essequibo; Rio Capin, Para; Rio Cupai; Bahia).—Lütken, Dan. Vidensk. Selsk. Skr., (5), XII, 1875, 184 (Rio das Velhas).—Günther, Proc. Zool. Soc. London, 1868, 239 (Huallaga).—Steindachner, "Süsswasserfische d. Südöstlichen Brasilien," 1874, 26 (Orinoco; Essequibo; Amazon; Rio Plata; Rio San Francisco; Rio Una).—Cope, Proc. Am. Philos. Soc., XVII, 1878, 694 (Peruvian Amazon).—Steindachner, "Fisch-fauna Magdalenen-Stromes," 1878, 31 (Rio Magdalena); "Fisch-fauna des Cauca," etc., 1880, 14 (Cauca); "Flussfische Süda-

merika's," iv, 1882, 11 (Huallaga).—Perugia, Ann. Mus. Genova, (2*a*), X, 1891, 39 (Rio de la Plata; Chaco; Paraná; Rio Paraguay).—Boulenger, Boll. Mus. Torino, X, 1895, 2 (Colonia Risso).—Perugia, Ann. Mus. Genova, (2), XVIII, 1897, 24 (Reyes).—Boulenger, Boll. Mus. Zool. ed Anat. Comp. Torino, XII, 1897, — (San Lorenzo); XV, 1900, — (Urucuru).—Regan, Proc. Zool. Soc. London, 1906, 382 (Trinidad).

Erythrinus macrodon Agassiz, Selecta Gen. et Spec. Pisc. Bras., 1829, 43, pl. 18, (Almada, Prov. Bahia; Rio San Francisco).

Erythrinus microcephalus Agassiz, Selecta Gen. et Spec. Pisc. Bras., 1829, 44 (Rio San Francisco).

Erythrinus brasiliensis Spix, Selecta Gen. et Spec. Pisc. Bras., 1829, 45, pl. 20 (Pernaguacu).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 633 (all streams).—Castelnau, Anim. Am. Sud, Poiss. (Carandahy; Rio das Mortes, Minas Geraes).

Macrodon guarina Valenciennes, in Humboldt, Rec. Obs. Zool., II, 1833, 179, pl. 48, fig. 1.—Cuvier and Valenciennes, Hist. Nat. Poiss., XIX, 1846, 527 (Lake Tacarigua).

Macrodon auritus Cuvier and Valenciennes, Hist. Nat. Poiss., XIX, 1846, 519 (Montevideo).—Steindachner, "Ichthyologische Notizen," ix, 1869, 12 (Montevideo).

Macrodon teres Cuvier and Valenciennes, Hist. Nat. Poiss., XIX, 1846, 521 (Maracaibo).

Macrodon patana Cuvier and Valenciennes, Hist. Nat. Poiss., XIX, 1846, 522 (Cayenne).

Macrodon ferox Gill, Ann. Lyc. Nat. Hist. N. Y., VI, 1858, 51 (Trinidad).

Five specimens, 124–183 mm. Barima River. (C. M. Cat. No. 2179*a–c*; I. U. Cat. No. 12343.)

Two specimens, 80–108 mm. Issorora. (C. M. Cat. No. 2180*a*; I. U. Cat. No. 12344.)

One specimen, 103 mm. Koreabo. (C. M. Cat. No. 2181.)

One specimen, 178 mm. Rupununi. (C. M. Cat. No. 2182.)

One specimen, 175 mm. Below Packeoo Falls. (C. M. Cat. No. 2183*a*.)

One specimen, 160 mm. Crab Falls. (C. M. Cat. No. 2184*a*.)

Two specimens, 83–87 mm. Rockstone. (C. M. Cat. No. 2185; I. U. Cat. No. 12345.)

Thirteen specimens, 87–225 mm. Gluck Island. (C. M. Cat. No. 2186*a–c*; I. U. Cat. No. 12346.)

Three specimens 237–330 mm. Chipoo Creek, a branch of the Ireng. (C. M. Cat. No. 2187*a–b*; I. U. Cat. No. 12347.)

Two specimens, 100 mm. Aruataima. (C. M. Cat. No. 2188; I. U. Cat. No. 12348.)

Nine specimens, 108–440 mm. Holmia. (C. M. Cat. No. 2189*a–d*; I. U. Cat. No. 12349*a–d*.)

Four specimens, 101–180 mm. Maduni Creek. (C. M. Cat. No. 2190*a–b*; I. U. Cat. No. 12352.)

Sixteen specimens, 90–425 mm. Lama Stop-Off. (C. M. Cat. No. 2191*a–c*; I. U. Cat. No. 12353.)

Six specimens, 65–217 mm. Botanic Garden. (C. M. Cat. No. 2192*a–c*; I. U. Cat. No. 12354.)

Eighteen specimens, 119–400 mm. Georgetown trenches. (C. M. Cat. No. 2193*a–d*; I. U. Cat. No. 12355.)

Three specimens, 102–165 mm. Nickaparu. (C. M. Cat. No. 2204*a–b*; I. U. Cat. No. 12356.)

Five specimens, 80–155 mm. Kumaka. (C. M. Cat. No. 2195*a–c*; I. U. Cat. No. 12357.)

One specimen, 280 mm. Wismar. (C. M. Cat. No. 2203*a*.)

One specimen, 135 mm. Below Wismar. (C. M. Cat. No. 2196.)

Two specimens, 251–265 mm. Mora Passage. (C. M. Cat. No. 2197*a*; I. U. Cat. No. 12358.)

Eighteen specimens, 110–295 mm. Aruka River. (C. M. Cat. No. 2198*a–d*; I. U. Cat. No. 12359.)

Four specimens, 57–120 mm. Savannah Landing. (C. M. Cat. No. 2199 *a–b*; I. U. Cat. No. 12350.)

One specimen, 176 mm. Waratuk. (C. M. Cat. No. 2200.)

Twelve specimens, 42–254 mm. Amatuk. (C. M. Cat. No. 2201*a–c*; I. U. Cat. No. 12351.)

One specimen, 113 mm. Creek below Potaro Landing. (C. M. Cat. No. 2202.)

Head 3–3.4; depth 4.3; D. 14, rarely 15 or 13; A. 10–11; lateral line 38 or 39 in lower Potaro specimens, usually 41 or 42 elsewhere.[64]

Eye 7 in the head in specimens 200 mm. and larger, 5–6 in specimens 100–200 mm.,[65] 4.3–5 in specimens 50–100 mm., 2.4 in the interorbital in specimens

[64] Of those examined five have 40, fourteen have 41, seventeen have 42, six have 43, and two have 44.

[65] 4.5 in the specimens from Crab Falls.

300–400 mm. long, 1.6–2 in specimens 200–300 mm., 1.5 in specimens 100–200 mm., 1–1.3 in specimens between 50 and 100 mm.

Very similar to *H. macrophthalmus,* but with a smaller eye and different color-pattern.

A median band in the young, broken up into vertical bars in older individuals, and more or less uniform in the adult; fins all spotted or barred or both.

In the larger specimens from Amatuk the color is almost plain black, while the caudal and anal are crossed by narrow white lines; otherwise they are black. In the Crab Falls specimen the caudal, anal, ventrals, and pectorals are black, the tips lighter but without bands, the body black. In the Waratuk specimen the fins are as in the Amatuk specimens, but the body is lighter and shows short longitudinal spots with a lighter reticulation.

This species is much more widely distributed than *P. macrophthalmus.* It is found along the coast as well as above the Kaieteur Falls.

Hoplerythrinus Gill.

Hoplerythrinus Gill, Proc. U. S. Nat. Mus., XVIII, 1895, 208.

Ophiocephalops Fowler, Proc. Acad. Nat. Sci. Phila., 1906, 293.

Type, *Erythrinus unitæniatus* Bloch.

This genus differs from *Erythrinus* in having teeth on the pterygoids as well as on the palatines.

268. **Hoplerythrinus unitæniatus** (Spix).

"Wara" (of the Indians about Holmia); "Houri" (in the lowlands).

"Maturaque" Marcgrave, Hist. Rer. Nat. Bras., IV, 1648, 169 (in standing water).

? *Synodontis palustris* Bloch and Schneider, Syst. Ichth., 1801, 398 (Brazil).

Erythrinus unitæniatus Spix, Selecta Gen. et Spec. Pisc. Bras., 1829, 42, pl. 19 (San Francisco).—Müller and Troschel, Horæ Ichth., I, 1845, 5, pl. 3, fig. 1 (Brazil; Guiana).—Cuvier and Valenciennes, Hist. Nat. Poiss., XIX, 1846, 486 (Maná; Cayenne; Bahia).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 632 (Canuku mountain streams).—Günther, Catalogue, V, 1864, 283 (Demerara; Surinam; Essequibo; River Capin, Pará; Rio Cupai; Bahia); Proc. Zool. Soc. London, 1868, 239 (Trinidad).—Steindachner, "Süsswasserfische d. Südöstlichen Brasilien," 1874, 28 (Rio Parahyba; Victoria; Bahia; Santarem; Villa Bella; Porto do Moz; Obidos; Cudajas; Curupira; Tabatinga; Avary; Manes; Lago José Assu); "Flussfische Südamerika's," iv, 1882, 11 (Rio Amazonas; Iquitos).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), I, 1888, 105 (São Matheos; Rio Doce; Bahia; Pará; Cudajas;

Obidos; Villa Bella; Serpa; Santarem; Silva, Lake Saraca; Hyanuary; Manes; Porto do Moz; Curupira; Tabatinga; Lake José Assu; Goyaz).—Vaillant, Notes from Leyden Mus., XX, 1898, 14 (Berbice); Bull. Mus. d'Hist. Nat., V, 1899, 154 (Carsevenne; Carnot).—Regan, Proc. Zool. Soc. London, 1906, 382 (Trinidad).—Eigenmann and Ogle, Proc. U. S. Nat. Mus., XXXIII, 1907, 36 (Trinidad).—Eigenmann, Ann. Carnegie Mus., IV, 1907, 124 (Bahia Negra).

Hoplerythrinus unitæniatus Gill, Proc. U. S. Nat. Mus., 1895, 208.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 448.

Erythrinus salvus Agassiz, Selecta Gen. et Spec. Pisc. Bras., 1829, 41 (Rio San Francisco).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 632 (forest streams and ponds).—Eigenmann and Eigenmann, Proc. Cal. Acad. Sci., (2), II, 1888, 107.

Erythrinus vittatus Cuvier and Valenciennes, Hist. Nat. Poiss., XIX, 1846, 499, pl. 585 (Cayenne, Surinam; Brazil).

Erythrinus gronovii Cuvier and Valenciennes, Hist. Nat. Poiss., XIX, 1846, 500 (Cayenne).—Günther, Catalogue, V, 1864, 284.—Peters, MB. Akad. Wiss. Berlin, 1877, 472 (Calobozo).

One specimen, 195 mm. Nickaparu Creek. (C. M. Cat. No. 2163.)

One specimen, 180 mm. Below Packeoo. (C. M. Cat. No. 2164.)

Ten specimens, 140–190 mm. Creeks about Aruataima. (C. M. Cat. No. 2168*a–b*; I. U. Cat. No. 12331.)

Two specimens, 150–275 mm. Savannah Landing. (C. M. Cat. No. 2169*a*; I. U. Cat. No. 12332.)

Eight specimens, 88–140 mm. Holmia. (C. M. Cat. No. 2170*a–b*; I. U. Cat. No. 12333.)

One specimen, 147 mm. Gluck Island. (C. M. Cat. No. 2165.)

One specimen, 300 mm. Lama Stop-Off. (C. M. Cat. No. 2166.)

Fourteen specimens, 205–290 mm. Georgetown market. (C. M. Cat. No. 2171*a–c*; I. U. Cat. No. 12334.)

One specimen, 135 mm. Pacopoo Pan. (C. M. Cat. No. 2167.)

Six specimens, 85–122 mm. Twoca Pan. (C. M. Cat. No. 2172*a–c*; I. U. Cat. No. 12335.)

Head 3.3–3.5; depth 4.25; D. 10; A. 11; scales 3–32 to 36–3. Eye 1.5 in the snout, 6 in the head, 2.75 in the interorbital.

Very similar in most respects to *Erythrinus erythrinus*. Dorsal rounded in both sexes; ventrals broad, rounded, not reaching the anus; top of head without

spots; a subcircular opercular spot; three dark lines radiating from the eye; usually a broad conspicuous black band on the middle of the sides, the areas above and below it marbled. Caudal usually uniform, the lateral band sometimes continued on it, and the rays above and below it spotted; posterior part of anal and especially the dorsal profusely spotted.

In some of the specimens from Twoca Pan the lateral band is obscure, and the sides have vertical markings approaching those of *Erythrinus*. In living specimens at Holmia the edges of the pectorals, ventrals, and anal were carmine red, and a streak from the pectoral to the anal orange.

The specimens from Georgetown, taken the middle of August, were breeding. The black band is very obscure or absent in these; the bases of the fins are dark.

The anal fin in the breeding males is swollen; the pocket formed by the base of the last anal ray and the sheath of the fin is prominent; a row of scales from the base of this pocket to the second scale above the origin of the anal have the margin deeply incised and covered with a roll of thick skin, which is thence continued down to the anus.

ERYTHRINUS Gronow.

Erythrinus GRONOW, Zoophyl., 1763, 114 (based on *Cyprinus cylindricus* Linnæus = *C. cephalus* Linnæus, part, = *salmoneus*).—MÜLLER, Arch. f. Anat., Phys., und Wiss. Med., 1842, 308 (sp.).—MÜLLER and TROSCHEL, Horæ Ichth., I, 1845, 5 (sp.).—GÜNTHER, Catalogue, V, 1864, 283 (*unitæniatus*, *gronovii*).

Hetererythrinus GÜNTHER, Catalogue, V, 1864, 283 (*salmoneus*).

Type, *Cyprinus cylindricus* Linnæus = *Erythrinus erythrinus* (Bloch and Schneider).

No occipital crest, no fontanel, no adipose fin; caudal rounded; anterior nares tubular, marginal; gill-membranes free, the openings wide; walls of the anterior portion of the posterior air-bladder cellular. Palatine teeth all villiform, in a single patch on the sides of the palate. Maxillary with pectinate teeth only, no canines. Dentary with short conical teeth; two canines near the symphysis, the outer of which is the larger; no lateral canines. All the teeth blunt. Dentary process joined for its whole length to the dentiferous ridge. Premaxillary without a pit. Snout decurved, rounded. Supratemporal plate double. Pterygoids without teeth.

269. **Erythrinus erythrinus** (Bloch and Schneider).

"Waioma" (of the Indians at Holmia).

Cyprinus cylindricus LINNÆUS, Mus. Adolphi Fred., 1754, 77, pl. 30.

Cyprinus cephalus LINNÆUS, Syst. Nat., ed. 10, I, 1758, 322; ed. 12, I, 1766, 527, part.

Erythrinus GRONOW, Mus. Ichth., II, 1754, 6, No. 154, pl. 7, fig. 6; Zoophyl., 1763, 114.

Synodus erythrinus BLOCH and SCHNEIDER, Syst. Ichth., 1801, 397.

Erythrinus erythrinus EIGENMANN and EIGENMANN, Proc. Cal. Acad. Sci., (2), II, 1889, 107 (Surinam; British Guiana; Gurupa; Tajapurú; Porto do Moz; Santarem; Cudajas; Lago Alexo; Manacapurú; Teffé; Tabatinga; Rio de Janeiro; Ueranduba).—EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 448.

Erythrinus salmoneus GRONOW, Mus. Ichth., 1754, 170 (Surinam).—GÜNTHER, Catalogue, V, 1864, 284 (Surinam; Rio Cupai).—STEINDACHNER, "Süsswasserfische d. Südöstlichen Brasilien," iii, 1876, 39 (Gurupa; Santarem; Tabatinga; Cudajas; Ueranduba; Tajapurú; Lago Alexo; Manacapurú).—COPE, Proc. Am. Philos. Soc., XVII, 1878, 694 (Peruvian Amazon).

Erythrinus brevicauda GÜNTHER, Catalogue, V, 1864, 285 (habitat ?).—COPE, Proc. Am. Philos. Soc., XVII, 1878, 698 (Peruvian Amazon).

Erythrinus longipinnis GÜNTHER, Catalogue, V, 1864, 108 (Essequibo).—EIGENMANN and EIGENMANN, Proc. Cal. Acad. Sci., (2), II, 1888, 108.

There is considerable difference in the size of the fins in the sexes. In the female the dorsal is narrowly rounded behind, the tip reaching the vertical from the middle of the base of the anal; in the male the second and third ray from the end may be prolonged, reaching the vertical from the tip of the last ray (not the longest) of the anal. Similarly the ventrals in the female fall far short of the anus, while in one specimen they reach the base of the fourth anal ray. It seems very probable, therefore, that Günther's *E. longipinnis* is based on a male with the extreme length of fins.

Six specimens, 90–150 mm. Yacktonick Fall. (C. M. Cat. No. 2157*a–d*; I. U. Cat. No. 12326.)

Nine specimens, 68–170 mm. Aruataima. (C. M. Cat. No. 2160*a–f*; I. U. Cat. No. 12329.)

Thirty-seven specimens, 45–170 mm. Holmia. (C. M. Cat. No. 2161*a–f*; I. U. Cat. No. 12330*a–f*.)

Three specimens, 82–144 mm. Savannah Landing. (C. M. Cat. No. 2153*a–b*; I. U. Cat. No. 12323.)

Ten specimens, 35–150 mm. Tukeit. (C. M. Cat. No. 2152*a–d*; I. U. Cat. No. 12322*a–b*.)

Two specimens, 88–97 mm. Creek below Potaro Landing. (C. M. Cat. No. 2158; I. U. Cat. No. 12327.)

Sixteen specimens, 77–165 mm. Nickaparu Creek. (C. M. Cat. No. 2154*a–d*; I. U. Cat. No. 12324.)

Fourteen specimens, 70–148 mm. Below Packeoo Falls. (C. M. Cat. No. 2155*a–c*; I. U. Cat. No. 12325.)

One specimen, 125 mm. Rockstone. (C. M. Cat. No. 2156.)

Four specimens, 74–120 mm. Kumaka. (C. M. Cat. No. 2159*a–b*; I. U. Cat. No. 12328.)

Head 3.66–3.75; depth 4–4.5; D. 10–12; A. 9–12; scales 3–33 or 34–3; eye 1.5 in snout, 6 in head, 2.66 in interorbital.

Amia-shaped, subterete; caudal peduncle compressed; head blunt, depressed; mouth oblique, the lips meeting in an irregular line, the mouth scarcely perceptible when closed. No dorsal or ventral keels. Scales cycloid, with a few longitudinal striæ and many minute corrugations; fins naked.

Dorsal considerably behind the middle, more or less angulated at the tip of the antepenultimate ray, sometimes prolonged; caudal short-rounded; anal short angulated; origin of ventrals a little in front or a little behind the vertical from the origin of the dorsal; ventrals trowel-shaped, of variable length; pectorals rounded, reaching about half-way to the ventrals.

Dark brown above, top of head with small round dark spots; frequently a dark spot at the base of the upper caudal rays, and another one on the sides below the dorsal; a dark humeral spot in the young; sides marbled and clouded with vertical markings on the tail; sides of head in light-colored individuals with alternate light and dark bars radiating from the eye, in dark-colored individuals with a lunate bright spot covering opercle; posterior part or sometimes the entire caudal, especially its middle, and sometimes the posterior part of the anal with light and dark bands; pectorals and ventrals uniform light or dark.

In life the ventrals, anal, and lower part of caudal are reddish, the margin as well as sides olive; lower parts yellow.

Order **GLANENCHELI.**

Family X. GYMNOTIDÆ.[66]

Eels and Electric Eels.

Gymnotidæ Bonaparte, Cat. Metod. dei Pesci Europei, 1846, —.

Sternopygidæ Cope, Proc. Am. Ass. Adv. Sci., XX, 1871, 333.

Electrophoridæ Gill, Arrangement of the Families of Fishes, 1872, 18.

[66] This account of the Gymnotidæ was prepared by Dr. Max Mapes Ellis, then a Fellow in Zoology in Indiana University.

Gymnotidæ Cope, Proc. Am. Ass. Adv. Sci., XX, 1871, 333.

Eel-like fishes without a dorsal fin and a very long anal fin.

Key to the Guiana Genera of Gymnotidæ.

a. No frontal fontanel; no dorsal filament; no true caudal fin; lower jaw projecting; head depressed; teeth conical, in sockets.

b. Anal basis extending around the end of the tail, forming a false caudal; electric organs well-developed; body not scaled. (*Electrophorinæ.*) ..... Electrophorus.

bb. Anal basis not extending around the end of the slender cylindrical tail; electric organs wanting; body scaled. (*Gymnotinæ.*) ..... Gymnotus.

aa. Large frontal and parietal fontanels; lower jaw not projecting; head not depressed; teeth if present villiform, in patches, and without deep sockets.

c. No caudal fin; tail beyond the anal fin, slender, pointed; no dorsal filament.

d. Sides of the entire body scaled. (*Sternopyginæ.*)

e. Snout short, not tubular.

f. Orbital margin free; teeth in both jaws; air-bladder long and conical..... Sternopygus.

ff. Orbital margin not free.

g. Teeth in both jaws; much compressed; air-bladder short and subspherical. Eigenmannia.

gg. No teeth; body subcylindrical.

h. A cylindrical filament in a groove on each side of the mental region; head chubby. Steatogenys.

hh. No filaments as above; head rather pointed..... Hypopomus.

ee. Snout tubular; without free orbital margin; very much compressed and elongate. Rhamphichthys.

dd. Anterior portion of the sides without scales. ..... Gymnorhamphichthys.

cc. With caudal fin; tail short; without free orbital margin; a dorsal filament; teeth in patches on one or both jaws. (*Sternarchinæ.*)

i. Caudal at the end of a peduncle; anal not reaching caudal.

j. Snout much produced; teeth in both jaws.

k. Snout decurved..... Sternarchorhynchus.

(*kk.* Snout straight..... Sternarchorhamphus.)

jj. Snout heavy and blunt, not produced.

l. Teeth in one or both jaws.

m. Teeth in both jaws.

n. Back scaled completely, or at least for some distance in front of the dorsal filament.

o. Gape long, angle of the mouth little if any in front of the eye; snout long. Sternarchus.

(*oo.* Gape short, angle of the mouth below the anterior or posterior nostrils; snout short..... Sternarchella.)

nn. Back naked to beyond the dorsal filament; scales along the lateral line large. Porotergus.

mm. Upper jaw without teeth, those of the lower jaw in a single series; snout very short. Sternarchogiton.

ll. Teeth wanting; lower jaw with a distinct V-shaped median groove for the reception of the pointed decurved upper jaw; head rather chubby.....**Adontosternarchus.**

ii. Caudal and anal confluent; snout straight.....**Orthosternarchus.**

Subfamily Electrophorinæ.

Electrophorus Gill.

Gymnotus Linnæus, Syst. Nat., ed. 12, I, 1766, 427.

Electrophorus Gill, Proc. Acad. Nat. Sci. Phila., 1864, 151.

Type, *Gymnotus electricus* Linnæus.

No frontal fontanel; anal basis extending around the end of the tail, forming a false caudal; electric organs well-developed on each side of the lower part of the tail; teeth conical, in one row in each jaw; body very elongate and without scales.

The single species of this genus is the remarkable "Electric Eel" of South America.

270. **Electrophorus electricus** (Linnæus).

Gymnotus electricus Linnæus, Syst. Nat., ed. 12, I, 1766, 427.—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 639 (all fresh-waters of British Guiana).—Steindachner, SB. Akad. Wiss. Wien, LVIII, 1868, 14 (Surinam).—Günther, Catalogue, VIII, 1870, 10 (Guiana).

Electrophorus electricus Gill, Proc. Acad. Nat. Sci. Phila., 1864, 151.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 450.

Three specimens, 650–825 mm. Tumatumari. (C. M. Cat. No. 1302; I. U. Cat. No. 12634.)

Three specimens, 190–580 mm. Creek below Potaro Landing. (I. U. Cat. No. 12633; C. M. Cat. No. 1754*a*.)

One specimen. Pacopoo Pan. (C. M. Cat. No. 1755.)

Head 8–9.2; depth 14.5–16 in the length to the end of the anal; anal rays 357, 362, 324 in three specimens; snout about 3.5 in the head, interorbital a little less; eye 5–5.2 in the snout, and 15 or 16 in the head.

Body cylindrical, elongate, and naked; head depressed; width of the head about equal to, and depth of the head in the occipital region a little less, than the greatest depth of the body; anus a little more than the length of the snout behind the vertical from the eye, in front of the pectorals; ventral and dorsal profiles almost straight.

Snout heavy and broad; mouth large; gape moderately long but not quite reaching to below the eye; lower jaw protruding; teeth small conical, a single row in each jaw; eyes small, without free orbital margin.

Origin of the anal about the length of the head behind the pectorals; anal fin of uniform width, and continuing around the end of the tail so as to form a false caudal; pectorals small, fan-shaped, 2.8 to 3.5 in the head.

Ground-color a uniform dark blue, lighter ventrally; fins much darker and fringed (especially the pectorals) with white.

Subfamily Gymnotinæ.

Gymnotus Linnæus.

Gymnotus Linnæus, Syst. Nat., ed. 10, I, 1758, 246 (*carapo*).

Carapus Cuvier, Règne Animal, II, 1817, 237.

Giton Kaup, in Duméril, Analyt. Ichth., 1856, 201.

Type, *Gymnotus carapo* Linnæus.

No frontal fontanel; anal basis not extending around the end of the tail, which is cylindrical and terminal; body scaled; teeth conical, in one row in each jaw. No electric organs.

But a single species of this genus is known, which, however, is the most widely dispersed Gymnotid, ranging from Central America over most of South America east of the Andes.

271. Gymnotus carapo Linnæus.

"Carapo" Marcgrave, Hist. Rer. Nat. Bras., 1648, 170.

Gymnotus carapo Linnæus, Syst. Nat., ed. 10, I, 1758, 246.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 450.

Gymnotus fasciatus Pallas, Spic. Zool., VII, 1769, 35.—Schomburgk, Fishes Brit. Guiana, II, 1842, 174, pl. 19.

Carapus fasciatus Cuvier, Règne Animal, II, 1817, 237.—Steindachner, "Die Gymnotidæ," 1868, 13 (Surinam).—Günther, Catalogue, VIII, 1870, 9 (Surinam and British Guiana).

Giton fasciatus Kaup, in Duméril, Analyt. Ichth., 1856, 201.—Eigenmann and Ward, Proc. Wash. Acad. Sci., VII, 1905, 177.

Gymnotus albus Pallas, Spic. Zool., VII, 1769, 36 (Surinam).

Carapus albus Kaup, Cat. Apod. Fish, 1856, 140 (French Guiana).

Gymnotus brachiurus Bloch, Ausl. Fische, II, 1786, 61, pl. 157, fig. 1.

Gymnotus putaol Lacépède, Hist. Nat. Poiss., II, 1800, 176.

Carapus brachyurus Cuvier, Règne Animal, II, 1817, 237.

Carapus inæquilabiatus Valenciennes, in d'Orbigny, Voy. Am. Mer., V, ii, 1847, pl. 14.

Thirty-four specimens, 80–435 mm. Holmia. (C. M. Cat. No. 1776*a–e*; I. U. Cat. No. 12622.)

Thirty-two specimens, 80–340 mm. Nickaparu Creek. (C. M. Cat. No. 1777*a–e*; I. U. Cat. No. 12623.)

Eighteen specimens, 65–310 mm. Creek below Tukeit. (C. M. Cat. No. 1778*a–e*; I. U. Cat. No. 12624.)

Fifteen specimens, 80–380 mm. Aruataima. (C. M. Cat. No. 1779*a–e*; I. U. Cat. No. 12625.)

Twelve specimens, 51–90 mm. Tukeit. (C. M. Cat. No. 1780*a–c*; I. U. Cat. No. 12626.)

Six specimens, 59–105 mm. Below Packeoo Falls. (C. M. Cat. No. 1781*a–b*; I. U. Cat. No. 12627.)

Four specimens, 125–198 mm. Gluck Island. (C. M. Cat. No. 1782*a*; I. U. Cat. No. 12628.)

Ten specimens, 50–176 mm. Kumaka. (C. M. Cat. No. 1782*a–d*; I. U. Cat. No. 12629.)

Five specimens, 132–205 mm. Mud-flats, Aruka River. (C. M. Cat. No. 1784*a*; I. U. Cat. No. 12630.)

Five specimens, 80–115 mm. Creek flowing into the Barima River. (C. M. Cat. No. 1785; I. U. Cat. No. 12631.)

Seven specimens, 125–162 mm. Above Kumaka. (C. M. Cat. No. 1786*a–b*; I. U. Cat. No. 12632.)

One specimen, 190 mm. Packeoo Falls. (C. M. Cat. No. 1787*a*.)

One specimen, 320 mm. Georgetown trenches. (C. M. Cat. No. 1788*a*.)

One specimen, 230 mm. Botanic Garden. (C. M. Cat. No. 1789*a*.)

One specimen, 240 mm. Chipoo Creek. (C. M. Cat. No. 1790*a*.)

One specimen, 260 mm. Maripicru Creek. (C. M. Cat. No. 1791*a*.)

Head 7.25 (old individuals) –9 (young specimens); depth 8.5–13 in the length to the end of the anal; A. 200–260.[67]

Snout 2.5–2.75; interorbital 2.25–2.5 in the head; eye 4 (young)–5.5 in the snout, 4.25–5 in the interorbital, 10–12 in the head.

Body cylindrical; head depressed; width of the head 1.25–1.6, depth of the head at base of occipital process 1.5–1.8 in the greatest depth; anus on the vertical from a point the length of the snout behind the eye; dorsal profile almost straight; ventral profile slightly convex.

[67]

Barima,	208,	217,	218,	224,	256.
Kumaka,	212,	224,	228,	240,	254.
Aruataima,	200,	215,	216,	230,	260.
Nickaparu,	211,	217,	225,	240,	260.
Holmia,	207,	220,	225,	235,	245.

Snout very slightly pointed in young specimens, blunt in adults; mouth rather large; gape straight, reaching about two-thirds of the distance to the eye; upper jaw included; lower jaw projecting; a single row of teeth in each jaw; eyes rather small; caudal peduncle one-half the length of the snout or less; pectorals 2.25–3 in the head; origin of the anal behind the pectorals on the vertical from a point about 1.5 times the snout behind the head.

Ground-color varying from a light slate-gray in young specimens to a light orange in adults; a series of transverse white stripes crossing the body in young individuals, which stripes widen and become yellow with age, so that the adults are yellow, banded with black; dorsal parts washed with a dark chocolate-brown containing numerous black spots; fins translucent, mottled with black or brown.

Subfamily Sternopyginæ.

Sternopygus Müller and Troschel.

Gymnotus Cuvier, Règne Animal, II, 1817, 235.—Gill, Proc. Acad. Nat. Sci. Phila., 1864, 152.

Sternopygus Müller and Troschel, Horæ Ichth., III, 1849, 13.

Type, *Gymnotus macrurus* Bloch and Schneider.

Distinguished from all other Gymnotids by the free orbital margin; no caudal fin; teeth in patches on both jaws; snout short and stout.

272. **Sternopygus macrurus** (Bloch and Schneider).

Gymnotus macrurus Cuvier, Règne Animal, II, 1817, 237.

Carapus arenatus Eydoux and Souleyet, Voy. Bonite, Zool., I, 1836, 210, pl. 8, fig. 2.

Sternopygus macrurus Müller and Troschel, Horæ Ichth., III, 1849, 13.—Steindachner, "Die Gymnotidæ," 1868, 11 (Surinam).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 450.

Sternopygus marcgravii Reinhardt, Vidensk. Med. Nat. For. Kjöbenhavn, 1852, —.

Carapus sanguinolentus Castelnau, Anim. Am. Sud, Poiss., 1855, 85, pl. 32, fig. 1.

Sternopygus carapus Günther, Catalogue, VIII, 1870, 7.—Steindachner, "Flussfische Südamerika's," ii, 1881, 44 (Surinam).

Gymnotus carapus (not of Linnæus) Eigenmann and Ward, Proc. Wash. Acad. Sci., VII, 1905, 175.

One hundred and four specimens, 155–500 mm. Botanic Garden. (C. M. Cat. No. 1764*a–i*; I. U. Cat. No. 12591.)

Eighteen specimens, 200–400 mm. Georgetown trenches. (C. M. Cat. No. 1765*a–e*; I. U. Cat. No. 12592.)

Ten specimens, 150–450 mm. Creek below Potaro Landing. (C. M. Cat. No. 1766*a–d*; I. U. Cat. No. 12593.)

Nine specimens, 65–390 mm. Amatuk. (C. M. Cat. No. 1767*a–d*; I. U. Cat. No. 12594.)

Ten specimens, 118–212 mm. Wismar. (C. M. Cat. No. 1768*a–d*; I. U. Cat. No. 12595.)

Eight specimens, 111–212 mm. Crab Falls. (C. M. Cat. No. 1769*a*; I. U. Cat. No. 12596.)

Six specimens, 90–100 mm. Erukin. (C. M. Cat. No. 1770*a–b*; I. U. Cat. No. 12597.)

Three specimens, 115–378 mm. Warraputa. (C. M. Cat. No. 1771*a*; I. U. Cat. No. 12598.)

Six specimens, 128–350 mm. Mud Creek, Aruka River. (C. M. Cat. No. 1772*a–b*; I. U. Cat. No. 12599.)

Two specimens, 180–195 mm. Konawaruk. (C. M. Cat. No. 1773*a*; I. U. Cat. No. 12600.)

One specimen, 430 mm. Issorora Rubber Station trenches. (C. M. Cat. No. 1774*a*.)

One specimen, 215 mm. Waratuk. (C. M. Cat. No. 1775*a*.)

Head 6.8–7.25, depth 7–7.3 in the length to the end of anal; anal rays 245–296.[68]

Snout 2.75–3, interorbital about 3 in the head; eye 3.75–4 in the snout, about 4 in the interorbital, and 10–13 in the head.

Compressed; width of the head 2–2.25, depth of the head in the occipital region about 1.5 in the greatest depth; anus about twice the eye behind the vertical from the eye; dorsal profile weakly convex; ventral slightly more convex than dorsal.

Snout heavy, rather pointed, but truncate at the tip; mouth moderate, gape medium, reaching about half-way to the eyes; jaws equal, lower included on the sides.

Caudal peduncle 4.5–5 in the total length; pectorals about 2.4 in the head; origin of the anal in front of the pectorals, about twice the snout behind the eye.

[68] Botanic Garden,	265,	270,	270,	277,	278.
Georgetown trenches,	249,	254,	263,	264,	271, 290.
Potaro Landing,	245,	250,	265,	272,	296.
Issorora Rubber Station,		273.			

Ground-color stone-gray to buff; body closely pigmented with minute purple spots, which are more abundant dorsally; a yellowish white lateral streak of variable intensity and width—being almost wanting in some specimens—beginning a little ventrad of the lateral line, at a point about half the total length from the head, and continuing well out on the caudal appendage; a bluish black spot about twice the size of the eye at the origin of the lateral line; head rather dark above; fins hyaline.

Specimens were found in the catch from Potaro Landing in particular, as well as at Aruka and Amatuk, which were very much darker than the average, being a dark blue. Since the ground-color was darker the lateral stripe appeared more strikingly white in these specimens.

Eigenmannia Jordan and Evermann.

Sternopygus Müller and Troschel, Horæ Ichth., III, 1849, 13.

Cryptops Eigenmann, Ann. N. Y. Acad. Sci., VII, 1894, 626 (preoccupied).

Eigenmannia Jordan and Evermann, Bull. U. S. Nat. Mus. No. 47, I, 1896, 341.

Type, *Sternopygus humboldtii* Steindachner.

No free orbital margin; teeth in patches on both jaws; snout not produced; no caudal fin, tail beyond the anal, slender, cylindrical, and pointed.

The two species known from British Guiana may be distinguished by the following key:

Key to the Guiana Species of Eigenmannia.

a. Eye large, its diameter longer than the maxillary; caudal appendage long, equal to almost half the total length. ..... macrops.

aa. Eye medium, its diameter equal to the maxillary; caudal appendage 3.25–4.75 in total length. . virescens.

273. Eigenmannia macrops (Boulenger).

Sternopygus macrops Boulenger, Ann. and Mag. Nat. Hist., (6), XX, 1897, 305 (British Guiana).

Eigenmannia macrops Eigenmann and Ward, Proc. Wash. Acad. Sci., VII, 1905, 172.

Eigenmannia mierops Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 449.

Thirty-two specimens, 165–200 mm. Rockstone. (C. M. Cat. No. 1804*a–e*; I. U. Cat. No. 12601.)

Twelve specimens, 165–180 mm. Tumatumari. (C. M. Cat. No. 1805*a–d*; I. U. Cat. No. 12602.)

Twelve specimens, 125–150 mm. Crab Falls. (C. M. Cat. No. 1806*a–d*; I. U. Cat. No. 12603.)

Head 8.25–9, depth 6.6–7.5 in the length to the end of the anal; anal rays 170–194;[69] snout 3.2–3.4, interorbital about 3.3 in the head; eye equal to or a little greater than either the snout or the interorbital and 3 or a little less in the head.

Body and head compressed; width of the head 2.25–2.5, depth of the head in the occipital region 1.6–1.8 in the greatest depth; anus on or slightly in front of the vertical from the posterior margin of the eye; dorsal profile almost straight; ventral profile of the head sloping caudad, at an angle of forty-five degrees; the body tapering; snout short and pointed; mouth very narrow; gape quite short; upper jaw overlapping lower; teeth present in both jaws; eyes large, greater than maxillary.

Caudal peduncle narrow, ribbon-like, equal to about half the total length without the head; pectorals about twice the eye; origin of the anal slightly behind the base of the pectorals, on a vertical from a point about the length of the snout behind the head.

Ground-color varying from a pale yellowish brown to almost yellow; origin of the anal rays, the scales of the lateral line, and most of the dorsal scales more or less outlined with black; a narrow median dorsal streak of dark brown or black; top of head bluish black; fins hyaline.

Reported only from British Guiana.

274. Eigenmannia virescens (Valenciennes).

Sternarchus virescens Valenciennes, in d'Orbigny, Voy. Am. Mer., V, ii, 1847, 11, pl. 13, fig. 2.

Sternopygus virescens Müller and Troschel, in Schomburgk, Reisen, III, 1848, 640 (Lake Amucu forest streams).—Kaup, Cat. Apod. Fish, 1856, 137.—Günther, Catalogue, VIII, 1870, 7 (Surinam).

Cryptops virescens Eigenmann, Ann. N. Y. Acad. Sci., VII, 1894, 626.

Eigenmannia virescens Eigenmann and Norris, Rev. Mus. Paulista, IV, 1901, 549.—Eigenmann and Ward, Proc. Wash. Acad. Sci., VII, 1905, 173.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 449.

Sternopygus tumifrons Müller and Troschel, Horæ Ichth., III, 1849, 14.

Sternopygus lineatus Müller and Troschel, in Schomburgk, Reisen, III, 1848, 640 (small forest brooks); Horæ Ichth., III, 1849, 14 (Lake Amucu in British

[69] Rockstone, 176, 178, 179, 181, 194.
Tumatumari, 170, 174, 182, 183, 184.

Guiana).—Steindachner, "Die Gymnotidæ," 1868, 13 (Essequibo River, British Guiana).

Twenty-nine specimens, 155–290 mm. Wismar. (C. M. Cat. No. 1742*a–e*; I. U. Cat. No. 12604.)

One specimen, 130 mm. Kumaka. (C. M. Cat. No. 1743*a*.)

One hundred and fifty-five specimens, 105–300 mm. Botanic Garden. (C. M. Cat. No. 1744*a–i*; I. U. Cat. No. 12605.)

Twenty-six specimens, 105–300 mm. Georgetown trenches. (C. M. Cat. No. 1745*a–e*; I. U. Cat. No. 12606.)

Twenty-four specimens, 110–180 mm. Demerara. (C. M. Cat. No. 1746*a–e*; I. U. Cat. No. 12607.)

One specimen, 80 mm. Rupununi Pan. (C. M. Cat. No. 1747*a*.)

Four specimens, 120–150 mm. Warraputa. (C. M. Cat. No. 1748*a*; I U. Cat. No. 12608.)

Five specimens, 80–135 mm. Chipoo Creek. (C. M. Cat. No. 1749*a*; I. U. Cat. No. 12609.)

One specimen, 190 mm. Wismar. (C. M. Cat. No. 1750*a*.)

Three specimens, 80–160 mm. Maripicru. (C. M. Cat. No. 1751*a*; I. U. Cat. No. 12610.)

Two specimens, 130–190 mm. Creek below Potaro Landing. (C. M. Cat. No. 1752*a*; I. U. Cat. No. 12611.)

One specimen, 100 mm. Kangaruma. (C. M. Cat. No. 1753*a*.)

One specimen, 92 mm. Savannah Landing. (C. M. Cat. No. ——.)

Head 7–10.5, depth 5.2–7 in the length to the end of the anal; anal rays 185, 188, 189, 190, 190, 191, 194, 196, 197, 208, 210, 218, 220, 224.

Snout 3–3.25, interorbital 2.1–3.25 in the head; eye about 2 in the snout, 1.5–3 in the interorbital, nearly 6 in the head.

Head and fore part of the body rather chubby, caudal region compressed; width of the head 2.25–2.4, depth of the head in the occipital region about 2 in the greatest depth; anus on vertical from anterior margin of the eye; dorsal profile rather convex, ventral profile distinctly convex from tip of snout to middle of anal, beyond this rather straight.

Snout heavy, short and blunt; mouth moderate; gape medium; jaws about equal, lower included on the sides; teeth present in both jaws; eyes small.

Caudal peduncle 3.25–4.5 in the total length; origin of the anal about one-third of the pectoral behind the vertical from origin of the pectoral.

Ground color pale buff; dorsal parts and top of head gray; scales more or less

faintly outlined with black; belly lighter; the lateral line and three stripes parallel with it dark (any or all of these stripes, which are ventrad to the lateral line, vary considerably in width and intensity, and may even be almost wanting); a black bar at the origin of each anal ray; fins hyaline; caudal peduncle bluish gray above and pale yellow below.

STEATOGENYS Boulenger.

Steatogenys BOULENGER, Trans. Zool. Soc. London, XIV, 1898, 428 (*elegans*).

Type, *Rhamphichthys elegans* Steindachner.

Distinguished from all other Gymnotids by a small cylindrical filament in a groove on each side of the mental region. Otherwise the same as *Hypopomus*. A genus of a single species.

275. **Steatogenys elegans** Steindachner.

Rhamphichthys (*Brachyrhamphichthys*) *elegans* STEINDACHNER, "Fisch-fauna des Cauca," etc., 1880, 37.

Steatogenys elegans BOULENGER, Trans. Zool. Soc. London, XIV, 1898, 428.—EIGENMANN and WARD, Proc. Wash. Acad. Sci., VII, 1905, 171.—EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 449.

Three specimens, 75–192 mm. Kumaka. (C. M. Cat. No. 1756*a*; I. U. Cat. No. 12614.)

One specimen (broken; length estimated at 150 mm.). Wismar. (C. M. Cat. No. 1757*a*.)

Head 8.25–8.5, depth 5.25–5.5 in the length to the end of the anal; anal rays 160, 164, 175, in the Kumaka specimens; snout 3.3–3.7, interorbital 3 or a little more in the head; eye 1.5–1.75 in the snout, 1.7–2 in the interorbital and about 5 in the head.

Compressed back of the head, which is round and chubby; width of the head about 2.5, depth of the head in the occipital region 1.6–2 in the greatest depth; anus on or a little behind the vertical from the eye; dorsal profile convex; ventral profile abruptly convex to origin of the anal, beyond this very slightly convex.

Snout heavy, blunt; mouth moderate; gape short, not reaching to below the eyes; jaws equal; eyes small; an adipose filament about twice the length of the snout, lying in a groove on each side of the mental region.

Caudal peduncle not over 2.8 in the total length; pectorals 1–1.2 in the head; origin of the anal below that of the pectorals or a little caudad.

Ground-color dark golden brown, a series of twelve to twenty irregular bands of dark reddish brown, starting from the median dorsal line and crossing both the body and the anal fin (these bands more or less confluent in the region of the lateral

line); small golden brown spots on the median dorsal line at the junction of the dark bands from the sides; top and sides of the head almost black, with numerous pale yellow streaks crossing them; cheeks lighter; pectorals mottled with black; anal with numerous brown spots in the yellow interspaces between the brown bands.

Hypopomus Gill.

Hypopomus Gill, Proc. Acad. Nat. Sci. Phila., 1864, 152 (*mülleri*).

Brachyrhamphichthys Günther, Catalogue, VIII, 1870, 6.

Type, *Rhamphichthys mülleri* Kaup.

No caudal fin; snout short and not tubular; eyes without free orbital margin; teeth wanting; body rather cylindrical, head somewhat pointed.

Two species were taken in British Guiana.

Key to the Guiana Species of Hypopomus.

a. Snout blunt; length of head less than greatest depth of body; caudal appendage 4.5–5 in the total length. **brevirostris.**

aa. Snout somewhat pointed; length of head greater than greatest depth of body; caudal appendage 3–3.5 in the total length ..... **artedi.**

276. **Hypopomus brevirostris** (Steindachner).

Rhamphichthys brevirostris Steindachner, "Die Gymnotidæ," 1868, 6, pl. 2, fig. 2.

Brachyrhamphichthys brevirostris Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 62.

Hypopomus brevirostris Eigenmann and Kennedy, Proc. Acad. Nat. Sci. Phila., 1903, 530.—Eigenmann and Ward, Proc. Wash. Acad. Sci., VII, 1905, 170.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 449.

Four specimens, 57–165 mm. Mud Creek, Aruka River. (C. M. Cat. No. 1792*a*; I. U. Cat. No. 12615.)

Four specimens, 62–165 mm. Chipoo Creek. (C. M. Cat. No. 1793*a–b*; I. U. Cat. No. 12616.)

Two specimens, 95–105 mm. Pacopoo Pan. (C. M. Cat. No. 1794*a*; I. U. Cat. No. 12617.)

Four specimens, 118–160 mm. Nickaparu Creek. (C. M. Cat. No. 1795*a*; I. U. Cat. No. 12618.)

One specimen (broken), 80 mm. Savannah Landing. (C. M. Cat. No. 1796*a*.)

One specimen, 95 mm. Creek below Savannah Landing. (I. U. Cat. No. 12635.)

One specimen, 117 mm. Twoca Pan, Rupununi. (C. M. Cat. No. 1797*a*.)

One specimen, 70 mm. Kumaka. (C. M. Cat. No. 1798*a*.)

Head 8.25–9.25, greatest depth 7–9 in the length to the end of the anal; anal rays 220–260; snout 3.3–3.7; interorbital about 3 in the head; eye 2.5 in the interorbital, 2.5–3 in the snout, and about 6 in the head.

Body rather cylindrical, though slightly compressed caudad; head chubby but somewhat conical; width of head 2–2.5, depth of head in occipital region about 1.75 in greatest depth; anus twice the diameter of the eye behind the vertical from the eye; dorsal profile of the head distinctly slanting, that of the body weakly convex; ventral profile regularly convex.

Snout short and truncate; mouth small; gape very short; eyes moderately small; jaws equal.

Caudal peduncle 4.5–5 in the total length; pectorals 1.5–2 in the head; origin of the anal about the length of the snout behind the origin of the pectorals.

Ground-color buff, overlaid with chocolate-brown; dorsal parts dark, ventral lighter; numerous bands of dark brown crossing the body but not the anal; lateral line buff; head dark; fins bluish white to hyaline; rays more or less black.

277. **Hypopomus artedi** (Kaup).

—— Seba, Locupl. Rer. Nat. Thes. Acc. Descr., III, 1748, pl. 32, fig. 2.

Rhamphichthys artedi Kaup, Cat. Apod. Fish, 1856, 128.

Hypopomus artedi Eigenmann and Ward, Proc. Wash. Acad. Sci., VII, 1905, 170.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 449.

Brachyrhamphichthys artedi Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 62.

Rhamphichthys mülleri Kaup, Cat. Apod. Fish, 1856, 129 (French Guiana).

Hypopomus mulleri Gill, Proc. Acad. Nat. Sci. Phila., 1864, 152.

Brachyrhamphichthys mülleri Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 62.

Two specimens, 155–165 mm. Lama Stop-Off. (C. M. Cat. No. 1799*a*; I. U. Cat. No. 12619.)

Four specimens, 170–174 mm. Wismar. (C. M. Cat. No. 1800*a*; I. U. Cat. No. 12620.)

Two specimens, 80–160 mm. Gluck Island. (C. M. Cat. No. 1801*a*; I. U. Cat. No. 12621.)

One specimen, 175 mm. Kumaka. (C. M. Cat. No. 1802*a*.)

One specimen, 130 mm. Christianburg. (C. M. Cat. No. 1803*a*.)

Head 7.5–8.25, greatest depth 10–11 in the length to the end of the anal; snout 2.9–3.5, interorbital 5–6 in the head; eye about 2.5 in the snout, 1.8 in the interorbital and 5.8–6.8 in the head.

Body compressed and elongate, slightly subcylindrical towards the head; head conical and a little produced; width of the head 1.75–2, depth of the head in the occipital region 1.3–1.5 in the greatest depth; dorsal profile of the head slightly sloping, but of the body almost straight; ventral profile of the head and body somewhat convex.

Snout conical, a little truncate at the tip; mouth medium; gape small and short; upper jaw barely projecting; eyes small; cheeks round and full.

Caudal peduncle 3–3.5 in the total length; pectorals 1.75–2 in the head; origin of the anal about on the vertical from the tip of the pectorals.

Ground-color light buff to straw-yellow; dorsal parts and the caudal peduncle crossed by several bands of rather bright brown, which fade out near the middle of each side; ventral parts almost without markings, or with numerous blotches of pale brown; top of the head dark brown; sides of the head and mental region speckled with brown; fins hyaline, rays more or less brown.

Rhamphichthys Müller and Troschel.

Rhamphichthys Müller and Troschel, Horæ Ichth., III, 1849, 15 (*rostratus*).

Type, *Gymnotus rostratus* Linnæus.

No caudal fin; snout long and tubular, teeth wanting, body much compressed, anus in front of the vertical from the eye.

A single species was taken in British Guiana.

278. **Rhamphichthys rostratus** (Linnæus).

—— Seba, Locupl. Rer. Nat. Thes. Acc. Descr., II, 1748, pl. 69, fig. 3; III, 1748, 99, pl. 32, fig. 5.

Gymnotus Gronow, Mus. Ichth., 1754, No. 73.

Gymnotus rostratus Linnæus, Syst. Nat., ed. 12, I, 1766, 428.

Carapus rostratus Cuvier, Règne Animal, II, 1817, 237.

Rhamphichthys rostratus Müller and Troschel, in Schomburgk, Reisen, III, 1848, 640 (Demerara); Horæ Ichth., III, 1849, 15 (Guiana).—Günther, Catalogue, VIII, 1870, 5 (Surinam; British Guiana).—Eigenmann and Ward, Proc. Wash. Acad. Sci., VII, 1905, 168.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 449.

Gymnotus longirostratus Lacépède, Hist. Nat. Poiss., II, 1800, 178.

Rhamphichthys schomburgkii Kaup, Cat. Apod. Fish, 1856, 135, fig. 10.

Rhamphichthys schneideri Kaup, Cat. Apod. Fish, 1856, 136, fig. 11 (Cayenne).

Three specimens, 580–900 mm. Wismar. (C. M. Cat. No. 1761*a*; I. U. Cat. No. 12612.)

Head 6–8, greatest depth 11.3–12 in the length to the end of the anal; A. 410, 444, 469; snout 1.5–1.8, interorbital 8.5–9.5 in the head; eye 12–16 in the snout, 2.25–3 in the interorbital, 18–22 in the head.

Compressed and very elongate; width of head 2.3–2.5, depth of head in the occipital region 1.5–2 in the greatest depth; anus on or in front of the vertical from the eye; dorsal profile sloping to the occiput, then almost straight; ventral profile quite straight, except for a slight concavity in the mental region.

Snout long, tubular, and tapering; mouth small and slightly below the overhanging upper jaw; gape short and decurved, about one and one-half times the eye; lower jaw included, upper forming the extreme tip of the snout, slightly expanded and blunt at the end; teeth wanting; cheeks full and round; opercle rather prominent; eyes small.

Caudal peduncle 3.5–4 in the total length; pectorals 2.75 in the head; origin of the anal about three times the eye behind the vertical from the eye.

Ground-color chocolate-brown to yellowish brown; ventral parts lighter; numerous blotches of dark brown and black dorsally; many irregular bands of dark brown spots and blotches crossing the body and anal; anal heavily marked with black and brown spots over a background of creamy white; head dark, mottled with large black and small bluish white spots; mental regions almost white; pectorals spotted with black, brown, and white; caudal peduncle dark chocolate-brown banded with black.

Gymnorhamphichthys Ellis, gen. nov.

Anterior portion of sides without scales, but other characters much the same as in *Rhamphichthys*.

279. **Gymnorhamphichthys hypostomus** Ellis, sp. nov.[70]

Type, 215 mm. San Joaquin, Bolivia. (C. M. Cat. No. 3182.)

Cotype, one specimen, 180 mm. Rio Marmoré. (C. M. Cat. No. 3183*a*.)

Two specimens, 140–145 mm. Konawaruk. (I. U. Cat. No. 12641.)

Two specimens, 75–115 mm. Bastos. (C. M. Cat. No. 3184*a–b*.)

One specimen, 80 mm. Maciel, Rio Guaporé. (C. M. Cat. No. 3185*a*.)

One specimen, 125 mm. Puerto Bertoni, Alto Paraná. (I. U. Cat. No. 12642.)

Three specimens, 95–100 mm. Tumatumari. (I. U. Cat. No. 12613.)

Distinguished from all other Gymnotids, save the Electric Eel, by the absence of scales from the anterior portion of the body.

[70] This species was described from specimens from various parts of South America.

Head 4.8–7.1, depth 12.4–13.6 in the length to the end of the anal; snout 1.6–2, interorbital 8–14 in the head; eye 7–14 in the snout.

Body compressed, slender and quite elongate; width of the head 2–2.5, depth of the head in the occipital region 1.2–1.4 in the greatest depth of the body; anus on or a little behind the vertical from the posterior margin of the eye; dorsal and ventral profiles almost straight; snout produced, straight and tubular, its length varying in a direct ratio with that of the body; mouth small and somewhat under the upper jaw; gape short, 5–8 in the snout; jaws almost equal, but the lower so included by the hood-like upper that the open mouth is under the upper jaw; teeth wanting.

Caudal peduncle 3.5–4.5 in the total length; pectorals 1.8–2.8 in the head; origin of the anal on or slightly behind the vertical from the origin of the pectorals.

Ground-color buff; snout and top of the head more or less completely covered with black, especially the distal half of the snout; a number of irregular black blotches down the middle of the back, and a second row of larger black spots, more or less confluent with the dorsal ones, in the region of the lateral line and above; caudal appendage completely encircled by two or three broad black rings; fins hyaline. All of the black markings vary with the size of the fish. The smallest specimen at hand is almost devoid of black markings, only the dorsal ones being represented by a few scattered dots, while the amount of black steadily increases to the largest, which bears all of the spots described. The snout is also subject to variation, growing longer in the larger fish, hence the rather large range of the measurements in which the length of the head or snout figure.

Subfamily Sternarchinæ.

Sternarchorhynchus Castelnau.

Sternarchorhynchus Castelnau, Anim. Am. Sud, Poiss., 1855, 91, 95.
Rhamphosternarchus Günther, Catalogue, VIII, 1870, 4.

Type, *Sternarchorhynchus mulleri* Castelnau.

Caudal fin present; teeth in patches in both jaws; snout long, tubular and somewhat decurved; eyes without free orbital margin.

280. Sternarchorhynchus oxyrhynchus (Müller and Troschel).

Sternarchus oxyrhynchus Müller and Troschel, in Schomburgk, Reisen, III, 1848, 640 (Lower Essequibo); Horæ Ichth., III, 1849, 16, pl. 2, figs. 1 and 2

(Essequibo).[71]—Kaup, Cat. Apod. Fish, 1856, 127.—Günther, Catalogue, VIII, 1870, 4 (British Guiana).

Sternarchorhynchus oxyrhynchus Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 62.—Eigenmann and Ward, Proc. Wash. Acad. Sci., VII, 1905, 167.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 446.

Sternarchorhynchus mulleri Castelnau, Anim. Am. Sud, Poiss., 1855, 95.

One specimen, 185 mm. Warraputa. (C. M. Cat. No. 1807*a*.)

Four specimens, 165–240 mm. Amatuk. (C. M. Cat. No. 1808*a*; I. U. Cat. No. 12590.)

Head 4.8–5.1, depth 9.6–9.8 in the length to the end of the anal; A. 168–180.[72] Snout 1.6–1.8, interorbital 13 or 14 in the head; eye equal to the interorbital, 8.5–9 in the snout, 13–14 in the head.

Body and head compressed; width of head 2.75–3, depth of head in occipital region 1.25–1.4 in the greatest depth of the body; anus on or a little in front of the vertical from the eye; dorsal and ventral profiles, without the head, almost straight.

Snout long, tubular, decurved, of small diameter and tapering; mouth small, terminal; gape 1.5–2 in the eye; lower jaw included on the sides, though slightly projecting in front; teeth minute, conical, in two irregular median patches in upper jaw and two irregular series in lower jaw; eyes quite small; mucous pores abundant on head.

Caudal small, fan-shaped, terminal, two and one-half times the eye; pectorals about 2.75 in the head; origin of the anal about three times the eye behind the vertical from the eye.

Ground-color a uniform bistre brown to dark brown; head and dorsal parts darker; lateral line hyaline; fins hyaline, rays faintly outlined with dark brown.

Specimens from the Amazon, in size between these and Müller and Troschel's type, show intermediate measurements, and A. 192, 194, 197.

Sternarchus Bloch and Schneider.

Sternarchus Bloch and Schneider, Syst. Ichth., 1801, 497, pl. 94 (*albifrons*).

Type, *Gymnotus albifrons* Linnæus.

[71] I have examined the type in the Berlin Museum, 470 mm. No. 4086, Guiana, Schomburgk. Head 6.9 in the length to the end of the anal; depth 11 in the length to the anal; A. 216; interorbital 18 in the head; width of head nearly 4 in the greatest depth; depth of head 1.9 in the greatest depth; anus in front of the vertical from the anterior margin of the eye; gape at least as long as the eye; teeth of both jaws large, recurved, in a single series on the sides, in an irregular double series toward the front.

[72] Amatuk, 168, 168, 170, 174. Warraputa, 180.

Caudal fin present; teeth in patches on both jaws; mouth large; snout not tubular; eyes without free orbital margin.

KEY TO THE GUIANA SPECIES OF STERNARCHUS.

a. Snout long, pointed, eye about in middle of the head; color uniform dark seal-brown with lighter spots at base of caudal and on forehead..... leptorhynchus.

aa. Snout blunt, almost, if not, 3 in the head; color black with a large white band entirely crossing body near the end of the anal and at base of caudal; forehead white..... albifrons.

281. Sternarchus leptorhynchus sp. nov.

Type, 260 mm. Amatuk. (Carnegie Museum Catalog of Fishes No. 1763*a*.)

Cotype, 160 mm. (length estimated; specimen broken). Amatuk. (I. U. Cat. No. 12588.)

Cotypes, 98 mm. Warraputa. (C. M. Cat. No. 1764*a*.)

Head 4.9–5.2, greatest depth about 6.75 in the length to the end of the anal; A. 158–160; snout 2.2–2.3, interorbital 6.5–7.5 in the head; eye about 9 in the snout, 20–22 in the head, and 3–4 in the interorbital; thirteen to fifteen rows of scales above the lateral line.

Compressed and elongate; width of the head 3 or a little more, depth of the head in occipital region 1.3–1.5 in the greatest depth of the body; anus about four orbital diameters behind the vertical from the eye; dorsal profile of the head and anterior sixth of the body abruptly sloping to snout, dorsal profile of the remainder almost straight; ventral profile very weakly convex or almost straight.

Snout heavy, rather long, and slightly rounded; mouth large, gape reaching to just below the eyes; jaws equal, the lower included; teeth minute, conical, and few, in two irregular, somewhat incomplete rows along each side of the lower jaw, and in two irregular patches in the upper jaw.

Caudal 3.8–4, pectoral 2–2.25 in the head; origin of pectoral immediately behind gill-opening; origin of the anal about the length of the snout behind the vertical from the eye.

Color a uniform dark seal-brown; a dirty white spot at the origin of the caudal; a more or less interrupted pale yellow streak running along the median dorsal line from the tip of the snout to the middle of the back or farther (this streak a distinct band in the smallest specimens); lips creamy white; fins hyaline, rays outlined with dark brown.

282. Sternarchus albifrons (Linnæus).

Gymnotus albifrons LINNÆUS, Syst. Nat., ed. 12, I, 1766, 428.

Sternarchus albifrons Bloch and Schneider, Syst. Ichth., 1801, 497, pl. 94.—Eigenmann and Ward, Proc. Wash. Acad. Sci., VII, 1905, 162.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 448.

Apteronotus passan Lacépède, Hist. Nat. Poiss., II, 1800, 209, pl. 6, fig. 3.

Sternarchus lacepedii Castelnau, Anim. Am. Sud, Poiss., 1855, 93, pl. 45, fig. 3 (Surinam).

Sternarchus maximiliani Castelnau, Anim. Am. Sud, Poiss., 1855, 93, pl. 45, fig. 4 (Urubamba).

Six specimens, 105–285 mm. Creek below Potaro Landing. (C. M. Cat. No. 1760*a–b*; I. U. Cat. No. 12589.)

Head 5.8–6.2; depth 5–5.5 in the length to the end of the anal; A. 155, 158, 164, 168, 170, respectively; snout 2.7–2.9, interorbital 3.25–3.5 in the head; eye 3.25–3.5 in the snout, 2.8–3 in the interorbital, 8.5–9 in the head; eleven to thirteen rows of scales above the lateral line.

Compressed and slightly elongate; width of the head 2.5–2.8, depth of head in occipital region 1.25–1.5 in the greatest depth; anus on or a little behind the vertical from the posterior margin of the eye; dorsal profile rather straight back of the head, which slopes abruptly to the snout.

Snout heavy, truncate, and rather short; mouth large, gape reaching to just below the eyes; jaws strong, lower included on the sides; teeth minute and conical, in two irregular rows in the lower jaw, and two circular patches (one on each side of the median line) in the upper jaw.

Caudal about 5, pectorals 1.2–1.4 in the head; origin of the anal in front of the pectorals, about four times the eye behind the vertical from the eye.

Ground-color rusty black; a dirty white band about one and one-half times the eye in width, extending in the median dorsal line from the tip of the snout to the occiput; two creamy white vertical bands or rings completely encircling the fish, the first beginning at about the one hundred and thirtieth anal ray and continuing to the end of the anal, the second (a smaller one) occurring at the origin of the caudal; anal opening and sometimes the extreme tip of the caudal white; eye in alcoholic specimens a bright china-blue; fins dead black.

Porotergus genus nov.

Type, *Porotergus gymnotus* sp. nov. Distinguished by the absence of scales along the back to beyond the origin of the dorsal filament; scales along the lateral line large; teeth in both jaws; other characters much as in *Sternarchus*.

283. **Porotergus gymnotus** sp. nov.

Type, 70 mm. Amatuk. (Carnegie Museum Catalog of Fishes No. 1759.)

Cotypes, two specimens, 68–85 mm. Amatuk. (I. U. Cat. No. 12636.)

Cotype, one specimen, 62 mm. Konawaruk. (C. M. Cat. No. 1758*a*.)

Head 6–6.5, greatest depth 6.2–6.7 in the length to the end of the anal. A. 130–147; snout 2.2–2.5, interorbital about the same in the head; eye 5–6 in the snout and 12–14 in the head; five to eight rows of scales above the lateral line; a mid-dorsal stripe, naked and abundantly supplied with mucous pores.

Compressed and slender; depth of the head in occipital region 1.25–1.5 in the greatest depth; anus not quite the length of the snout behind the vertical from the eye; dorsal profile behind the head almost straight, the head sharply sloping; ventral profile slightly convex, save in the mental region, where it is rather concave.

Snout heavy and somewhat truncate; mouth moderately large; gape straight, not quite or just barely reaching below the eye; jaws stout, lower included on the sides; teeth few, small, conical, in two irregular interrupted rows, the inner one of the lower jaw represented by but three or four teeth; two small patches of not over six teeth each in the upper jaw.

Caudal 2.8 in the head, pectorals 1.3; origin of the anal a little in front of the gill-opening.

Ground-color dark golden brown, darker dorsally; scales outlined with dark brown; upper parts of the head and back, as well as a spot at the origin of the lateral line, almost black; cheeks brown with numerous minute yellowish dots; lips, the openings of the mucous canals in the mid-dorsal region, the anus, and a small spot at origin of caudal, yellowish; fins hyaline.

284. **Porotergus gimbeli** sp. nov.[73]

Type, 205 mm. Pará, January 22, 1910 (Haseman). (Carnegie Museum Catalog of Fishes No. 3197.)

Cotypes, two specimens, 170–140 mm. Pará, January 22, 1910 (Haseman). (C. M. Cat. No. 3198*a*.)

Cotype, one specimen. Hubabu Creek, British Guiana, October 1, 1910 (Ellis).

Head 8.5–10.25; greatest depth of the body 8.25–9 in the length to the base of the caudal; A., type, 175, cotypes, 178, 167, 180.

Snout 3–3.6, interorbital 4–5 in the head; eye 3–3.5 in the snout, 2–2.8 in the interorbital, and 11–14 in the head; lateral line prominent, extending out on

[73] Named for Mr. J. Gimbel, whose generosity made the Gimbel Expedition possible.

the caudal. Snout rather short and blunt; mouth moderately large; jaws equal when closed, the lower included; teeth small, conical, and few in each jaw; eyes small.

Body and head compressed, the former rather elongate; width of the latter 2.5–3.1, its depth in the occipital region 1.3–1.6 in the greatest depth of the body; anus on the vertical from the eye; scales moderately large and prominent; a mid-dorsal band extending to the end of the dorsal filament, with numerous mucous pores and without scales; dorsal profile very weakly convex or almost straight; ventral profile somewhat convex.

Caudal fin 1.8–2.5, pectorals 1.2–1.5 in the head; origin of the anal the diameter of the eye or a little more in front of the vertical from the gill-opening; scales extending well out on the caudal.

Ground-color rather light yellowish brown; dorsal portions, especially the naked dorsal band, overlaid with dark brown; most of the scales somewhat outlined with brown; ventral parts lighter; a series of oblique blackish brown stripes, alternating with the anal rays, extending dorsad from the edge of the anal base about half-way to the lateral line; mouths of the mucous pores and the under parts of the head a clear, pale yellow or buff; anal hyaline; pectorals hyaline to dusky, the first two or three rays usually distinctly brown; caudal base whitish, the scaled portion of the caudal almost black, the outer margin hyaline.

A specimen, No. 2972, from Santarem, 190 mm., with head 7.5, snout 3, and A. 175, probably belongs here.

Order **SYMBRANCHII.**[74]

Family XI. SYMBRANCHIDÆ.

Symbranchus Bloch.

Synbranchus Bloch, Ausl. Fische, IX, 1795, 87 (*marmoratus*).
Unibranchapertura Lacépède, Hist. Nat. Poiss., V, 1803, 658 (*marmoratus*).
Ophisternon McClelland, Calcutta Journ. Nat. Hist., V, 1845, 197 (*bengalensis*).
Tetrabranchus Bleeker, Nat. Tijdschr. Ned. Ind., II, 1851, 69 (*microphthalmus*).

Type, *Synbranchus marmoratus* Bloch.

Eel-shaped, naked; abdomen much longer than the tail; gill-membranes united, leaving a single small median opening on the ventral surface; eye small, about 2 in the snout.

[74] It is very probable that the ordinary eel, *Anguilla chrysypa*, occasionally occurs in the fresh waters of Guiana, and Müller and Troschel remark that *Lycodontis ocellatus* (Agassiz) is sometimes taken in the plantation drains and reaches a length of three to four feet. The specimen in the Berlin Museum is 380 mm. long.

285. Symbranchus marmoratus Bloch.

Synbranchus marmoratus Bloch, Ausl. Fische, IX, 1795, 87, pl. 418.—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 640 (drains of plantations).—Günther, Catalogue, VIII, 1870, 15.—Steindachner, "Fisch-fauna des Cauca," etc., 1880, 38 (Cauca).—Cope, Proc. Am. Philos. Soc., XXXIII, 1893, 102 (Rio Grande do Sul).—Eigenmann, Ann. N. Y. Acad. Sci., VII, 1894, 625 (Pará), 632 (Rio Grande do Sul).—Boulenger, Boll. Mus. Zool. ed Anat. Comp. Torino, X, 1895, — (Asuncion); XII, 1897, — (Mission San Francisco).—Lahille, Rev. Mus. la Plata, VI, 1895, 270 (in all the rivulets).—Jordan and Evermann, Bull. U. S. Nat. Mus. No. 47, 1898, 342.—Boulenger, Boll. Mus. Zool. ed Anat. Comp. Torino, XV, 1900, — (Carandasiñho).—Eigenmann, Bull. U. S. Fish Com., XXII, 1903, 222 (Pinar del Rio, Cuba).—Meek, "Fresh-water Fishes of Mexico," 1904, 89.—Miller, Bull. Am. Mus. Nat. Hist., XXIII, 1907, 99 (Los Amates, Guatemala).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 450.

Synbranchus immaculatus Bloch, Ausl. Fische, IX, 1795, pl. 419, fig. 1.

Synbranchus transversalis Bloch and Schneider, Syst. Ichth., 1801, 524 (Guinea). (After Gronow.)

Unibranchapertura grisea, *marmorata*, *immaculata*, and *lineata* Lacépède, Hist. Nat. Poiss., V, 1803, 658 (Surinam).

Synbranchus fuliginosus Ranzani, Nov. Com. Acad. Sci. Inst. Bonon., IV, 1840, 75, pl. 11, fig. 1 (Brazil).

Muræna lumbricus Gronow, Cat. Fish, ed. Gray, 1854, 18 (Sea of Guinea).

Symbranchus vittatus Castelnau, Anim. Am. Sud, Poiss., 1855, 84, pl. 44, fig. 3 (Rio de Janeiro).

One specimen, 670 mm. Rupununi. (C. M. Cat. No. 2437.)

One specimen, 405 mm. Rockstone sand-bank. (I. U. Cat. No. 12565.)

Dark brown above, speckled below.

Order ISOSPONDYLI.

Key to the Families of Isospondyli.

a. A gular plate between the branches of the lower jaw.....Elopidæ, XII.

aa. No gular plate.

b. No lateral line; species small, largely marine.

c. Mouth moderate, terminal, the maxillary of three pieces.....Clupeidæ, XIII.

cc. Mouth subinferior, very large; maxillary long.....Engraulidæ, XIV.

bb. Lateral line well-developed; fresh-water species, some of them of large size.

d. Anal long; head compressed; mouth large; belly compressed to an edge.....Osteoglossidæ, XV.

dd. Anal short; head depressed; belly rounded.....Arapaimidæ, XVI.

Family XII. ELOPIDÆ.

Tarpons.

Tarpon Jordan and Evermann.

Tarpon Jordan and Evermann, Bull. U. S. Nat. Mus. No. 47, 1896, 409.

Type, *Megalops atlanticus* Cuvier and Valenciennes.

Oblong, having large silvery scales; anal longer than the dorsal; last dorsal ray produced.

286. **Tarpon atlanticus** (Cuvier and Valenciennes).

Megalops atlanticus Cuvier and Valenciennes, Hist. Nat. Poiss., XIX, 1846, 398 (Guadeloupe; San Domingo; Martinique; Porto Rico).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 639 (coast).

Tarpon atlanticus Jordan and Evermann, Bull. U. S. Nat. Mus. No. 47, 1896, 409. —Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 453.

Megalops elongatus Girard, Proc. Acad. Nat. Sci. Phila., 1858, 224 (Long Island.)

Megalops thrissoides Günther, Catalogue, VII, 1868, 472.

This fish, which has gone under the name *Megalops thrissoides* in most literature, is found in the lower courses of the rivers.

One specimen, 340 mm. Georgetown market. (C. M. Cat. No. 2427.)

Head 4.33; depth 4; D. 12; A. 20; lateral line 44. Compressed; mouth very large, the maxillary extending beyond the eye. Back bluish, elsewhere bright silvery.

Family XIII. CLUPEIDÆ.

Herrings.

Key to the Guiana Genera of Clupeidæ.

a. Ventrals present. Belly compressed to an edge, with strong serræ its entire length.

b. Anal short, with fifteen rays; origin of dorsal and anal about equidistant from the tip of the snout; scales adherent, their posterior margin strongly convex; last dorsal ray not produced; vertebræ thirty-nine. No adipose eyelid; maxillary with a sharp spur on its upper margin. . **Rhinosardinia.**

bb. Anal long, with thirty-nine rays; dorsal inserted posterior to the ventrals; lower jaw with four or five strong, conical, recurved teeth on each side in front; premaxillary with about fourteen graduate, conical teeth. Maxillary with minute but strong teeth along its entire margin; vomer without teeth; tongue with a broad patch of granular teeth. Origin of anal fin considerably behind base of last dorsal ray. Scales thin, adherent. Ventral armature strong; adipose lid very strongly developed, leaving a narrow vertical slit. Caudal forked..... **Ilisha.**

aa. No ventrals. Anal very long, with seventy or more rays; dorsal small, over the anal; teeth well-developed in both jaws, about fourteen in the upper and ten in the lower. Maxillary with teeth along its entire edge. Origin of anal fin near beginning of the second third of the length; scales caducous; abdominal armature weak; thoracic region expanded, strongly armed. Pectorals large..... . **Odontognathus.**

Rhinosardinia gen. nov.

Type, *Rhinosardinia serrata* sp. nov.

This genus is *Sardinella* with the dorsal and ventral equidistant from the tip of the snout, and the maxillary having a strong thorn directed upward and backward from its posterior surface near its upper end.

287. **Rhinosardinia serrata** sp. nov. (Plate LXII, figs. 3, 4.)

Type, 85 mm. Morawhanna. (Carnegie Museum Catalog of Fishes No. 2443.)

Cotypes, two hundred and eighty specimens, 60–85 mm. Morawhanna. (C. M. Cat. No. 2444*a–z*; I. U. Cat. No. 12558.)

Cotypes, fifteen specimens, 62–77 mm. Mora Passage. (C. M. Cat. No. 2445*a–h*; I. U. Cat. No. 12559.)

Head 4.5–4.6; depth 3–3.6; D. 13; A. 15; scales 37–40 in a median series, 8–10 between ventrals and the back; ventral serræ 26–28; eye 2.6 in the head.

Compressed; ventral edge greatly arched, dorsal outline less so; serræ very

Fig. 39. Maxillary bone of *Rhinosardinia serrata* Eigenmann.

strong; mouth small, oblique, the chin almost entering the profile; maxillary-premaxillary border 2.2–2.3 in the head; gill-rakers 1.5 in the eye, 11 + 32.

Dorsal nearer snout than to base of caudal by one-fifth to one-third the length of the head; origin of dorsal and ventrals about equidistant from the tip of the snout; caudal deeply forked, the lobes 3.2–3.3 in the length.

Scales firmly adherent, largest just above and in front of the ventrals; on each scale usually a pair of subparallel longitudinal striæ, strongest on the posterior part of the sides and on the tail, the striæ more numerous, sometimes reticulate, just in front of the caudal; caudal lobes scaled at their base.

Highly iridescent; no stripes or spots; back dotted; caudal profusely dotted; chin and snout dusky; dots above base of anal.

Ilisha Gray.

Platygaster Swainson, Class. Fishes, Amph., and Rept., II, 1839, 294 (*africanus*), name preoccupied.

Ilisha (Gray) Richardson, "Ichthyology of the Seas of China and Japan," in Proc. Brit. Ass. Adv. Sci., 1845 (1846), 306 (*abnormis*) (no description).—Bleeker, Nederl. Tijdschr. Dierk., 1866, 300 (*abnormis*).

Pellona Cuvier and Valenciennes, Hist. Nat. Poiss., XX, 1847, 300 (*orbignyana* = *flavipinnis*).

Characters as given in the key.

288. Ilisha flavipinnis (Valenciennes).

Pristigaster flavipinnis Valenciennes, in d'Orbigny, Voy. Am. Mer., V, ii, 1847, pl. 10, fig. 2 (Buenos Aires).

Pellona orbignyana Cuvier and Valenciennes, Hist. Nat. Poiss., XX, 1847, 306 (mouth of Amazon). (D. 19; A. 36–38.)

Pellona flavipinnis Günther, Catalogue, VII, 1868, 454.

Ilisha flavipinnis Jordan and Evermann, Bull. U. S. Nat. Mus. No. 47, 1896, 436.—Eigenmann, Proc. Wash. Acad. Sci., VIII, 1907, 453 (Buenos Aires); Repts. Princeton Univ. Exp. Patagonia, III, 1910, 452.

Three specimens, 260–270 mm. to the end of the middle caudal rays. Georgetown market. (C. M. Cat. Nos. 1485 and 2442; I. U. Cat. No. 12557.)

Head 4; depth 3; D. 19; A. 38–40; scales 60–62; eye .75 in the snout, 3.5 in the head; abdominal serræ 32–34.

Compressed; ventral profile greatly arched; dorsal outline nearly straight from snout to caudal; maxillary-premaxillary border 2 in the head; mouth oblique, the chin entering the profile.

Dorsal nearer to snout than to caudal by a space equal to the snout and eye, slightly emarginate, the tips of the first two-fifths of the rays extending beyond the tip of the last ray; at least the lower caudal lobe prolonged into a filament, the lobe with the filament 2.75 in the length, without the filament 3.75. Ventrals in advance of the dorsal, 2.3–3 in the head; distance of anal from snout greater than the distance of the base of the last dorsal ray from the snout by an orbital diameter.

Silvery; the caudal dusky.

Odontognathus Lacépède.

Odontognathus Lacépède, Hist. Nat. Poiss., II, 1799, 221.

Gnathobolus Bloch and Schneider, Syst. Ichth., 1801, 556.

Type, *Odontognathus mucronatus* Lacépède.

With the characters as given in the key.

289. Odontognathus mucronatus Lacépède.

Odontognathus mucronatus Lacépède, Hist. Nat. Poiss., II, 1799, 221, pl. 7, fig. 2 (Cayenne).—Jordan and Evermann, Bull. U. S. Nat. Mus. No. 47, 1896, 438.

Gnathobolus mucronatus Cuvier and Valenciennes, Hist. Nat. Poiss., XXI, 1848, 91.

Pristigaster mucronatus Günther, Catalogue, VII, 1868, 462.

Several specimens of this species were taken by Dr. Ellis in a trench in Georgetown.

Head 5.5; depth 4.5; D. 11; A. 71–79; scales 8+12; eye longer than snout, 3.5 in the head.

In general appearance like *Hydrolicus*. Very greatly compressed, the thorax somewhat expanded; the pectorals large, longer than the head. Maxillary mucronate. Dorsal entirely in the last third of the length.

Family XIV. ENGRAULIDÆ.

Anchovies.

Stolephorus Lacépède.

Stolephorus Lacépède, Hist. Nat. Poiss., V, 1803, 381.

Type, *Atherina japonica* Linnæus.

Teeth small, no canines; origin of dorsal in advance of that of the anal; gill-membranes nearly separate, free from the isthmus; no pectoral filaments.

Key to the Guiana Species of Stolephorus.

a. Anal about 15; preopercular margin not especially oblique; maxillary short, not reaching the angle of the preopercle; gill-rakers not equal to the pupil; pectorals not reaching the ventrals; origin of the dorsal a little nearer to the snout than to the caudal; origin of anal and base of last dorsal ray equidistant from the snout. Subfusiform, but little compressed; depth 5.3 in the length; maxillary extending beyond the eye. A lateral band; scales below it free from pigment or with black chromatophores; scales above it faintly outlined in black; mid-dorsal area with a double row of chromatophores; outer rays and caudal margin black.....guianensis.

aa. Anal about 25; D. 13; snout produced, pointed. Preopercular and opercular margin very oblique, maxillary reaching the angle of the preopercle; back narrowly spotted; base of anal with a series of dots; sides with faint dots.....surinamensis.

aaa. Anal about 37; maxillary reaching the gill-opening; subopercle with a flat triangular process...spinifer.

290. Stolephorus guianensis sp. nov. (Plate LXII, fig. 5.)

Type, 38 mm. Bartica rocks. (Carnegie Museum Catalog of Fishes No. 2448*a*.)

Cotype, 40 mm. Morawhanna. (I. U. Cat. No. 12562.)

Cotype, 51 mm. Mud-flats, Demerara River. (C. M. Cat. No. 2449*a*.)

Head 4.4; depth 5.25; D. 13; A. 18; scales 37–40, seven in a vertical series; eye .5 in the snout, 3 in the head.

Subfusiform; opercle and preopercle but little oblique; maxillary extending but little behind the eye; both jaws with minute teeth; about twenty rakers in the lower arch, the longest about 1.5 in the eye.

Origin of dorsal a little nearer to snout than to the caudal, or equidistant from them; ventral nearly an orbital diameter farther forward than the dorsal; origin of anal under the last dorsal ray; pectorals not reaching the ventrals.

Scales deciduous, with delicate, wide-meshed reticulations on the sides, and much more evident finer-meshed reticulations on the caudal peduncle.

A narrow lateral band, widest above the posterior part of the anal; a black mid-ventral line from the anus to the caudal; a double row of chromatophores on the back; snout and chin dark; margin of caudal and its outer rays black. No chromatophores on the sides below the lateral band.

Twelve specimens, 31–33 mm. Morawhanna. (C. M. Cat. No. 2450*a–f*; I. U. Cat. No. 12563.)

These specimens may represent this species. They are more compressed; no lateral band, entire side of tail with chromatophores, chin and snout pale; color otherwise much as in the preceding, except that the color of the back scarcely extends forward beyond the dorsal.

291. Stolephorus surinamensis Bleeker.

? *Engraulis clupeoides* Swainson, Class. Fishes, Amph., and Rept., II, 1839, 388 (Pernambuco).

Stolephorus clupeoides Jordan and Evermann, Bull. U. S. Nat. Mus. No. 47, 1896, 447.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 451.

Stolephorus surinamensis Bleeker, Nederl. Tijdschr. Dierk., 1866, 178 (Surinam).

Engraulis surinamensis Günther, Catalogue, VII, 1868, 393 (River Capin).—Steindachner, "Ichthyologische Beitrage," viii, 1875, 55.

Two small specimens, 27–37 mm. Bartica rocks. (C. M. Cat. No. 2447; I. U. Cat. No. 12561.)

Head 3–3.25; depth 4; D. 16; A. 26; scales about 34; eye 3.5 in the head.

Compressed; ventral profile more strongly arched than the dorsal; snout pointed, much projecting; minute teeth along both jaws; gill-rakers as long as the eye, about thirty-five on the lower arch (as compared with about one hundred in *productus*); margin of the opercle and preopercle very oblique, the maxillary reaching the angle of the preopercle.

Origin of dorsal equidistant from snout and caudal; origin of anal under last dorsal ray; pectoral reaching a little past the origin of the ventrals.

Scales deciduous, those of the sides with faint vertical lines, those of the caudal peduncle reticulate.

Silvery, without a band; sides with faint dots, back dotted, and a row of dots along the base of the anal.

292. **Stolephorus spinifer** (Cuvier and Valenciennes).

Engraulis thrissoides Müller and Troschel, in Schomburgk, Reisen, III, 1848, 639 (Cuyuni).

Engraulis spinifer Cuvier and Valenciennes, Hist. Nat. Poiss., XXI, 1848, 39 (Cayenne).—Günther, Catalogue, VII, 1868, 394 (British Guiana).

Stolephorus spinifer Jordan and Evermann, Bull. U. S. Nat. Mus. No. 47, 1896, 448.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 451.

Two specimens, 78 and about 205 mm. Georgetown market. (C. M. Cat. No. 2446; I. U. Cat. No. 12560.)

Head 4; depth 4; D. 15; A. 36; scales about 40; eye .8 in the snout, 4.5 in the head.

Compressed; posterior margin of opercle and preopercle very oblique; subopercle with a triangular projection; maxillary reaching to the gill-opening. Snout projecting; gill-rakers 1.5 in the eye, sixteen on the lower arch, fourteen on the upper.

Origin of dorsal nearer to snout than to base of caudal; ventrals a little in advance of the dorsal; pectorals reaching past origin of the ventrals; origin of anal a little in advance of the base of the last dorsal ray. Scales frosted, with fine reticulations. Silvery, back dotted, caudal bordered with dark. Brilliant orange in life.

I have also examined the specimen mentioned by Müller and Troschel and preserved in the Berlin Museum.

Family XV. OSTEOGLOSSIDÆ.

Osteoglossum Vandelli.

Osteoglossum (*ex* Vandelli) Agassiz, Selecta Gen. et Spec. Pisc. Bras., 1829, 45.

Ischnosoma Spix, Selecta Gen. et Spec. Pisc. Bras., 1829, 46.

Elongate, abdomen compressed to an edge; a pair of barbels on the lower jaw.

293. Osteoglossum bicirrhosum Vandelli.

"Arowana."

Osteoglossum bicirrhosum (*ex* Vandelli) Agassiz, Selecta Gen. et Spec. Pisc. Bras., 1829, 45 (Amazon).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 338 (Rupununi; Takutu; Rio Branco; Amucu).—Günther, Catalogue, VII, 1868, 378 (Pará; British Guiana).—Steindachner, "Flussfische Südamerika's," iv, 1882, 16 (Huallaga).—Eigenmann and Bean, Proc. U. S. Nat. Mus., XXXI, 1907, 666 (Amazon).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 453.

Ischnosoma bicirrhosum Spix, Selecta Gen. et Spec. Pisc. Bras., 1829, pl. 25 and A.

Osteoglossum vandellii Cuvier, Règne Animal, —, 18—, —.—Cuvier and Valenciennes, Hist. Nat. Poiss., XIX, 1846, 294, pl. 571.

Osteoglossum arowana Schomburgk, Fishes Brit. Guiana, I, 1841, 205, pl. 12.

Seven specimens, 232–312 mm. Rupununi. (C. M. Cat. No. 2416*a–d*; I. U. Cat. No. 12551.)

Specimens were seen at Crab Falls.

Head 5+; depth 5.5; D. 45–48; A. 53–57; scales 3–35–2.5; eye 1 in the snout, 4 in the head, 1 in the interorbital.

Elongate, compressed; back rounded, region behind the pectoral trenchant; mouth very large, oblique; maxillary-premaxillary border 1.33 in the head; opercle with a broad membraneous edge; thirteen rakers on the lower arch. Teeth all small.

Scales vertical, cycloid, decreasing in size toward the anal. Origin of dorsal nearer to the caudal than to the eyes, the anterior rays feeble; origin of the anal nearer to the snout than to its last ray; caudal small, rounded; ventrals reaching past origin of the anal; pectorals large, nearly reaching the anal.

Fins pink; sides ashy, each scale with a darker bar bordered with pink.

Family XVI. ARAPAIMIDÆ.

Arapaima Müller.

Sudis Cuvier, Règne Animal, II, 1817, 180.

Arapaima Müller, Abhand. Akad. Wiss. Berlin, 1846, 191.

Vastres Cuvier and Valenciennes, Hist. Nat. Poiss., XIX, 1846, 433.

Type, *Sudis gigas* Cuvier.

"Body elongate, compressed, head depressed, abdomen rounded. Mouth wide, lower jaw prominent; no barbels; jaws with an outer series of conical, small

teeth; broad bands of rasp-like teeth on vomer, palatines, pterygoids, sphenoid, tongue, and hyoid; pectorals of moderate length; ventrals scaly; gill-membranes separate." (Günther.)

294. **Arapaima gigas** (Cuvier).

Sudis gigas Cuvier, Règne Animal, II, 1817, 180.—Agassiz, Selecta Gen. et Spec. Pisc. Bras., 1829, 31, pl. B.—Schomburgk, Fishes Brit. Guiana, I, 1841, 198, pl. 11 (Rupununi; Rio Branco; Rio Negro; Amazon).

Arapaima gigas Müller, Abhand. Akad. Wiss. Berlin, 1846, 191.—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 638 (British Guiana).—Günther, Catalogue, VII, 1868, 379 (British Guiana; Bahia).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 453.

Sudis pirarucu Spix, Selecta Gen. et Spec. Pisc. Bras., 1829, pl. 16.

Vastres cuvieri Cuvier and Valenciennes, Hist. Nat. Poiss., XIX, 1846, 441, pls. 579, 580.

Vastres mapæ Cuvier and Valenciennes, Hist. Nat. Poiss., XIX, 1846, 449, pls. 580, 581.

Vastres agassizii Cuvier and Valenciennes, Hist. Nat. Poiss., XIX, 1846, 461.

This species has been taken near the mouth of the Potaro River and from there up into the Rupununi. It is said to reach fifteen feet in length and four hundred and ten pounds in weight. Head nearly 4; D. 34–37; A. 30–32; scales 6.5–56–6. B. 16.

Order **MICROCYPRINI.**

Family XVII. PŒCILIIDÆ.

"Four-eyes"; "Cockabilly," etc.

Head scaly above; mouth terminal or superior; premaxillary protractile; sides of the mouth formed by the premaxillary; teeth small, various; dorsal fin single, placed far back; caudal symmetrically or obliquely rounded, rarely forked.

Key to the Guiana Genera of Pœciliidæ.

a. Males similar to the females except in color; oviparous; dorsal smaller than anal, its origin behind that of anal; eyes normal; teeth conical, in several series; body subcylindrical. (*Fundulinæ.*).....**Rivulus.**

aa. Anal of the male modified; viviparous.

b. Eyes elevated, the upper part adjusted to see in the air, the lower in the water; dorsal behind the anal in both sexes. (*Anablepinæ.*).....**Anableps.**

bb. Eyes normal.

c. Caudal peduncle without a knife-like ridge below; anal fin of the male normal, on the lower surface of the abdomen. (*Pœciliinæ.*)

d. Intromittent organ not spine-bearing, composed of simply modified anal rays; males at least as large as the females.....**Pœcilia.**

dd. Intromittent organ with many retrorse spines in front and behind; males highly ornamented and much smaller than the females.....**Acanthophacelus.**

cc. Caudal peduncle with a knife-like ridge below; intromittent organ very long, placed under the pectoral, the ventrals of the male under the gill-opening; teeth conical, in a few series. Slender, hyaline. (*Tomeurinæ.*).....**Tomeurus.**

Subfamily Fundulinæ.

Rivulus Poey.

Rivulus Poey, Memorias sobre la Historia Natural de Cuba, II, 1858, 307, 383.

Type, *Rivulus cylindraceus* Poey.

Dorsal smaller than anal and farther back; females more brilliantly marked than the males and frequently with a caudal ocellus.

R. waimacui showed remarkable powers of climbing the high steps in the creek bed. One would spring out of the water and remain attached by its tail to the side of the rock, whence it would leap to a still higher point.

Key to the Guiana Species of Rivulus.

a. Sides without longitudinal markings, except a dark band from tip of lower jaw, continued as a darker shade of the general color of the side; head 4; depth 4.75; D. 9 or 10; A. 12; scales 35, counting to the last one on the caudal; twenty to twenty-three scales in front of the dorsal; eye 3.5, greater than snout, 1.6 in the interorbital; occipital scales as large as the two bordering it on its sides; caudal broad, subtruncate or rounded, with angular corners above and below; sides dusky, centers of the scales of the back darker; middle of caudal with about five cross-bars; ventrals margined with dark; dorsal and anal dark; origin of anal equidistant from base of middle caudal rays and upper angle of gill-opening. **breviceps.**

aa. Sides with longitudinal markings.

b. Anal 14–17.

c. Head 4–4.5; depth 5; D. 9 or 10; A. 15–17; scales 43 plus 4 on the base of the caudal rays; eye 3.5 in the head, equal to snout, 1.6 in the interorbital; occipital scale very narrow; caudal broadly rounded; origin of anal equidistant from base of middle caudal rays and upper angle of gill-openings; about thirty scales in front of the dorsal; female with a black spot on the upper part of the caudal peduncle; anterior parts of the male with numerous longitudinal lines; middle series of scales on caudal peduncle and second series above and below this with series of conspicuous spots; similar spots irregularly placed on other scales of the caudal peduncle and forward in the male; dorsal and caudal, and in less degree, the anal profusely spotted in the female, less so in the male; ventrals and anal margined.....**holmiæ.**

cc. Head 4.66–5; depth 5.5–6; D. 8; A. 14–16; scales 46–52 plus several on the base of the caudal rays; about thirty-three scales in front of dorsal; eye 3.75 in the head, 2 in the interorbital; sides in male with alternating light and dark stripes, the middle line of the sides light, bordered with rather wider dark bands, which have lighter spots or streaks in the center, above and below these alternating light and dark stripes; sides in female with a median dark stripe, a second one some distance below it and another above it, all much heavier on the caudal peduncle, where the lower of the three becomes especially heavy; ventrals and anal margined; caudal spotted near base in the female.....**waimacui.**

bb. Anal 11–13; head 4.5; depth 5.5.

d. Scales 42 or 43; D. 6 or 7; A. 11–12; caudal broadly rounded; origin of anal equidistant from base of middle caudal rays and upper angle of gill-openings; base of the anal equal to the head or head less snout; about thirty scales before the dorsal; female with a faint black spot on upper part of caudal peduncle; sides of the females with a dark spot on the center of each scale; sides of the males with a dark spot on the center of each scale and dark stripes between the rows of scales, especially noticeable on the flank, the dark spots becoming obscure at times with the increase in intensity of the stripes; ventrals pale; caudal cross-spotted; spots of the upper part of the sides olive-green, those of the lower rusty.....**stagnatus.**

dd. Scales 42 plus several on the base of the caudal peduncle; nine scales between dorsal and anal; D. 7; A. 13; caudal pointed lanceolate, with cross-bands between the rays; origin of the anal equidistant from the base of the middle caudal rays and the second scale behind the upper margin of the axil of the pectoral; base of anal equal to head less operele; over thirty scales before the dorsal.....**lanceolatus.**

ddd. About forty scales along the middle of the sides, eight between dorsal and anal, twenty-three before dorsal; D. 7; A. 11. Origin of anal equidistant from base of middle caudal rays and preoperele; base of anal equal to head less operele; anal, ventrals, and lower margin of caudal edged with black; a conspicuous black band forward from the eye and around the chin light lines along the rows of scales.....**frenatus.**

295. **Rivulus breviceps** Eigenmann. (Plate LXIII, fig. 1.)

Rivulus breviceps EIGENMANN, Ann. Carnegie Mus., XI, 1909, 49; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 455.

Type, 50 mm. Shrimp Creek. (Carnegie Museum Catalog of Fishes No. 1075.)

Cotypes, four specimens, 50, 35, 32, and 18 mm. respectively, at least the two larger being males. Shrimp Creek, where the path from Tukeit to the head of the Kaieteur crosses it. (C. M. Cat. No. 1515; I. U. Cat. No. 11758.)

Distinguished by its short head, few scales, and absence of longitudinal markings. This species was taken with *R. waimacui.*

296. **Rivulus holmiæ** Eigenmann. (Plate LXIII, figs. 2, 3.)

Rivulus holmiæ EIGENMANN, Ann. Carnegie Mus., VI, 1909, 50; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 455.

Type, a female, 77 mm. Holmia. (Carnegie Museum Catalog of Fishes No. 1076.)

Cotypes, four females, 38–77 mm., and thirteen males, 48–70 mm. Creeks about Holmia. (C. M. Cat. No. 1077; I. U. Cat. No. 11759.)

Rather abundant under the rocks of a small rivulet behind the Company's House at Holmia. My attention was first called to it by two Indian girls, who, while bathing, caught several specimens for me.

Belly in life yellow, spots in the smaller specimens rusty, sides bluish; dorsal and anal red, margined with olive. Spots in the female dark brown, sides olive.

It is interesting to note that the females have the distinguishing caudal spot, and are otherwise more brilliantly marked than the males.

297. **Rivulus waimacui** Eigenmann. (Plate LXIII, figs. 4, 5.)

"Waimacui."

Rivulus waimacui Eigenmann, Ann. Carnegie Mus., VI, 1909, 50; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 455.

Type, a female, 79 mm. Shrimp Creek. Carnegie Museum Catalog of Fishes No. 1078.)

Cotypes, five males, 57–88 mm.; seven females, 41–88 mm. Shrimp Creek. (C. M. Cat. No. 1079; I. U. Cat. No. 11760.)

Cotype, one specimen, 25 mm. Amatuk. (C. M. Cat. No. 1080.)

Cotype, one specimen, 41 mm. Waratuk. (C. M. Cat. No. 1081).

Rather abundant in Shrimp Creek ("Orimetuk" of the Indians, near the Kaieteur). At the time of my visit the water was confined to cracks in the long rocky steps forming the bed of this creek.

Female.—Upper surface olive. Sides cobalt-blue, shading to sky-blue below, alternating with stripes of bright red; dorsal and caudal margined with light greenish blue, somewhat rusty on lower edge; darker part of dorsal and caudal purple; anal very pale blue with rusty spots at base, then rusty, margined with dark purple, as are also the ventrals. Entire ventral surface salmon to orange; pectorals geranium-red to orange; ventrals, except at margin, like belly. Chin and lips purplish.

Male.—Caudal purplish red; anal yellowish with purple spots; belly white; back and sides olive-purplish with stripes of dark purple.

298. **Rivulus stagnatus** Eigenmann. (Plate LXIII, figs. 6, 7.)

Rivulus stagnatus Eigenmann, Ann. Carnegie Mus., VI, 1909, 50; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 455.

Type, a female, 44 mm. Christianburg. (Carnegie Museum Catalog of Fishes No. 1082.)

Cotypes, thirteen males, the largest 41 mm.; six females, the largest 46 mm. Christianburg. (C. M. Cat. No. 1083*a–d*; I. U. Cat. No. 11761.)

Abundant in little pools just below the saw-mill at Christianburg. Several specimens, probably belonging to this species, were sent me from Kumaka, on the Demerara above Wismar.

Caudal spots always along the rays, rarely confluent into zigzag cross-bars; anal plain or spotted, dorsal spotted.

299. **Rivulus lanceolatus** Eigenmann. (Plate LXIV, fig. 1.)

Rivulus lanceolatus Eigenmann, Ann. Carnegie Mus., VI, 1909, 51; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 455.

Type unique, 42.5 mm. Rockstone. (Carnegie Museum Catalog of Fishes No. 1084.)

300. **Rivulus frenatus** Eigenmann. (Plate LXIV, fig. 2.)

Rivulus frenatus Eigenmann, Ann. Carnegie Mus., VI, 1909, 51; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 455.

Type unique, 28 mm. Gluck Island. (Carnegie Museum Catalog of Fishes No. 1085.)

Subfamily Anablepinæ.

Anableps Gronow.

Anableps Gronow, Mus. Ichth., II, 1763, 7.—Scopoli, Intr. Hist. Nat., 1877, 450.—Bloch, Ausl. Fische, VIII, 1794, 7.

The Four-Eyes, the largest of the *Pœciliidæ*. Eyes in elevated sockets, the pupil divided by a horizontal cross-partition. Gives birth to living young several inches long. The sexes are dextral and sinistral, a right-sided male mating with a left-sided female. Anal of the male with a scaly tube.

Abundant on the surface of canals in brackish water, and capable of rapid locomotion by skipping along the surface.

Two species are brought to the Georgetown market. Only females were obtained by me, most of them with young.

Key to the Guiana Species of Anableps.

a. Space between the upper edges of the orbital ridges much greater than the eye; sides with conspicuous violet stripes. Scales 50–55, tr. 11; caudal rounded, but very little oblique; snout truncate. . . **anableps.**

aa. Space between the upper edges of orbital ridges equal to the diameter of the eye; sides with obscure stripes; scales 81–90, tr. 17–18; caudal very obliquely rounded; snout pointed. . . . . **microlepis.**

301. **Anableps anableps** (Linnæus).

Cobitis anableps Linnæus, Syst. Nat., ed. 10, I, 1758, 303.

Anableps anableps Garman, "Cyprinodonts," in Mem. Mus. Comp. Zool., XIX, 1895, 77.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 457.

Anableps tetrophthalmus Bloch, Ausl. Fische, VIII, 1794, 7, pl. 361.—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 632 (mouths of streams).—Eigenmann and Bean, Proc. U. S. Nat. Mus., XXXI, 1907, 667 (Amazon).

Anableps gronovii Walbaum, Art. Gen. Pisc., 1792, 160.
Anableps surinamensis Lacépède, Hist. Nat. Poiss., V, 1803, 25.
Anableps lineatus Gronow, Cat. Fish, ed. Gray, 1854, 192.

For a full bibliography see Garman's paper, above quoted.

Five adult specimens, 205–265 mm. Georgetown market. (C. M. Cat. No. 2225*a–e*; I. U. Cat. No. 12411.)

Distinguished by the characters given in the key.

302. **Anableps microlepis** Müller and Troschel.

Anableps microlepis Müller and Troschel, MB. Akad. Wiss. Berlin, 1844, 36; in Schomburgk, Reisen, III, 1848, 632.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 457.
Anableps coarctatus Cuvier and Valenciennes, Hist. Nat. Poiss., XVIII, 1846, 266.
Anableps elongatus Cuvier and Valenciennes, Hist. Nat. Poiss., XVIII, 1846, 267, pl. 541.

Fifty-one adult specimens, 197–315 mm. Georgetown market. (C. M. Cat. No. 2226*a–i*; I. U. Cat. No. 12412*a–e*.)

Subfamily Pœciliinæ.

Pœcilia Bloch and Schneider.

Pœcilia Bloch and Schneider, Syst. Ichth., 1801, 452.
Limia Poey, Memorias sobre la Historia Natural de Cuba, I, 1855, 383, 390.
Lebistes Fillippi, Archivio per la Zoológia, l'Anatomia e la Fisiologia, I, 1862, 69.

Type, *Pœcilia vivipara* Bloch and Schneider.

An outer series and an inner band of teeth in each jaw; sexes of about the same size; anal in the male modified, but not spine-bearing.

303. **Pœcilia vivipara** Bloch and Schneider. (Plate LXIV, figs. 3, 4.)

Pœcilia vivipara Bloch and Schneider, Syst. Ichth., 1801, 41, 452, pl. 86, fig. 2.—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 632 (Georgetown and other canals).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 460.—Garman, "Cyprinodonts," in Mem. Mus. Comp. Zool., XIX, 1895, 53.

For a full bibliography and synonymy see Garman's paper, above referred to. It is recorded from Martinique to Rio de Janeiro.

Sixty-two specimens, 20–56 mm. Georgetown trenches. (C. M. Cat. Nos. 1427*a–b* and 1428*a–j*; I. U. Cat. No. 12075.)

Head 3.75–4; depth 3; D. 7 or 8; A. 8; scales 25–27, about fourteen scales in front of dorsal; eye 3 in head, 2 in interorbital; origin of dorsal equidistant from base of middle caudal rays and thirteenth scale in front of the dorsal; origin of anal in the female about under origin of dorsal; ventrals in the female very short, half the length of the head; the outer rays of the ventral in the male prolonged, equal to head without snout, their tips reaching the tips of the posterior anal rays; first anal ray a little longer than head without the snout.

Sides with reticulations and silvery and dark cross-bands; frequently a black spot on the sides in front of the vertical from the dorsal; upper and lower margins of caudal black in the male.

Acanthophacelus Eigenmann.

Acanthophacelus Eigenmann, Proc. U. S. Nat. Mus., XXXII, 1907, 426, fig. 1.

Type, *Pœcilia reticulata* Peters.

Each jaw with two series of teeth; intromittent organ short, with numerous recurved hooks on the anterior and posterior margins. Males much smaller than the females and brilliantly colored. Viviparous, females 20 mm. long being mature.

Key to the Guiana Species of Acanthophacelus.

a. Male with a bright silvery lateral band, bordered above and below by black; females with wavy brown lines between the rows of scales on the flanks.....melanzonus.

aa. Male with two to four spots of varying size and variously placed along the sides, very variable; female with reticulated sides, unspotted.....reticulatus.

aaa. Male with a black caudal spot, usually prolonged along the dorsal and ventral margins; both male and female with a dark band on the upper part of the sides; about six scales behind the head...bifurcus.

304. **Acanthophacelus melanzonus** Eigenmann. (Plate LXIV, figs. 5, 6.)

Acanthophacelus melanzonus Eigenmann, Ann. Carnegie Mus., VI, 1909, 51; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 548.

Type, a male, 27 mm. Georgetown trenches. (Carnegie Museum Catalog of Fishes No. 1086.)

Cotypes, several females, the longest 39 mm. Georgetown trenches. (C. M. Cat. No. 1087*a–e*; I. U. Cat. No. 11762.)

Head 4+ ; depth 3.66–4; D. 6; A. 9; scales 27 to base of caudal; eye 3 in head, 3 in interorbital; depth of caudal peduncle 6.5 in the length; fourteen to sixteen scales in front of the dorsal; distance of origin of dorsal from caudal equal to eleven scales in front of the dorsal; end of anal and origin of dorsal equidistant from base of middle caudal rays; ventrals in the female barely reaching anal; pectorals beyond origin of ventrals.

Female with wavy longitudinal dark stripes on the flanks between the rows of scales, merging into brown-edged scales on the sides above the anal, sometimes a row of spots between the stripes, one on the margin of each scale; lower surfaces colorless; back dark brown; scales above the pectoral, between the two lower stripes, silvery white.

Male with a silvery band from the eye to the caudal, where it is bent upward, bordered above and below on the sides by black stripes, also bent up and confluent, but faint on the caudal; belly colorless; scales of the back margined with dark, those along the lower side of the caudal peduncle with fainter margins.

Fins unspotted in both sexes.

305. **Acanthophacelus reticulatus** (Peters). (Plate LXV, figs. 1–3.)

Pœcilia reticulata Peters, MB. Akad. Wiss. Berlin, 1859, 412 (Caracas).—Garman, "Cyprinodonts," in Mem. Mus. Comp. Zool., XIX, 1895, 62 (copied).—Steindachner and von Bayern, Denkschr. Akad. Wiss. Wien, LXXII, 1902, 145 (Cartagena).

Girardinus reticulatus Günther, Catalogue, VI, 1866, 352 (Caracas; Brazil).—Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 65.

Acanthophacelus reticulatus Eigenmann, Proc. U. S. Nat. Mus., XXXII, 1907, 426, fig. 1; Ann. Carnegie Mus., VI, 1909, 51 (Georgetown trenches).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 458.

Girardinus guppii Günther, Catalogue, VI, 1866, 353 (Trinidad; Venezuela).—Regan, Proc. Zool. Soc. London, 1906, 390, pl. 22, figs. 1, 1*a* (Trinidad).

Pœcilia branneri Eigenmann, Ann. N. Y. Acad. Sci., VII, 1894, 629 (Pará).

One hundred fifty-eight specimens, 15–50 mm. Georgetown trenches. (C. M. Cat. Nos. 1429*a–d*, males; 1430*a–z*, females; I. U. Cat. No. 12072.)

Several thousand specimens, largest male 25 mm.; largest female 48 mm. Barbados. (C. M. Cat. No. 1432; I. U. Cat. No. 12073–74.)

Two specimens. Creek in Aruka River. (C. M. Cat. No. 1431.)

Head 3.75; depth 3.75–4; D. 7; A. 10; eye 3 in the head, 2 in the interorbital; scales 27 or 28.

Female very similar to that of *Pœcilia vivipara*, but without a lateral spot and without silvery and dark cross-shades; sides reticulate.

Males very variable, those from Georgetown with one or two black spots.

The males from Barbados show the greatest variability in color. Some are uniform, while in others the chromatophores are concentrated into longitudinal or transverse bands, and in others the bands or several bands are concentrated into

black spots, surrounded by pigmentless areas or with comet-like tails of pigment cells.

There is no doubt that the specimens from Barbados and Georgetown are very similar. It is, of course, possible that they are specifically distinct. The females are alike, and with the males so extremely variable it is not possible to point out constant differences.

306. **Acanthophacelus bifurcus** Eigenmann. (Plate LXV, figs. 4–6.)

Acanthophacelus bifurcus Eigenmann, Ann. Carnegie Mus., VI, 1909, 52; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 458.

Type, a male, 22 mm. Christianburg. (Carnegie Museum Catalog of Fishes No. 1088.)

Cotypes, twenty-four females, the largest 29 mm. Small pond at Christianburg. (C. M. Cat. No. 1089*a–e*; I. U. Cat. No. 11763.)

Cotypes, thirteen males, the largest 24 mm. Small pond at Christianburg. (C. M. Cat. No. 1090*a–e*; I. U. Cat. No. 11764.)

Cotypes, twenty-nine females, the largest 25 mm. Small creek at Wismar. (C. M. Cat. No. 1091*a–e*; I. U. Cat. No. 11765.)

Cotypes, eight males, the largest 24 mm. Small creek at Wismar. (C. M. Cat. No. 1092*a–b*; I. U. Cat. No. 11766.)

Some of the females only 20 mm. long are with young.

Head 3.33–3.75; depth at origin of anal 4.5; depth of caudal peduncle 5.5; D. 7; A. 8; scales 26 or 27 to base of caudal; eye 2.5 in the head, 1.33 in the interorbital; fourteen scales in front of the dorsal.

Slender, much more so than *Pœcilia vivipara;* origin of dorsal about equidistant from base of middle caudal rays and occiput; end of anal below the vertical from origin of the dorsal; ventrals in the female reaching slightly beyond origin of anal; pectorals to the ventrals.

Females with a dark vertical spot on the upper part of the sides about six scales behind the head, margined with lighter; dark borders of the scales of the sides forming a regular reticulation; a black median line behind the anal; base and tip of dorsal blackest, all the other fins hyaline.

Male with the general color of the female, the dorsal nearly black; caudal with a variously shaped, dark olive-green, vertical band at its base, usually continued into a long prong along the entire upper margin of the fin, very frequently continued into a shorter prong along the ventral edge of the fin, the basal bar sometimes diffused over the entire caudal peduncle; anal with some black.

In life, sides of male yellowish, caudal peduncle pokeberry-red to dark olive-green; upper caudal prong bordered by pokeberry-red below, or rusty; one male with a black streak and a milk-white margin to the anal.

Subfamily Tomeurinæ.

Tomeurus Eigenmann.

Tomeurus Eigenmann, Ann. Carnegie Mus., VI, 1909, 53.

Teeth conical, in about three series; dorsal placed far back over the last fourth of the body; anal in the female in advance of the middle of the body, in the male moved forward to below the origin of the pectorals; ventrals not evident in the female, minute, under the upper angle of the gill-opening, in the male; pectorals large; alimentary canal much shorter than the body; caudal peduncle with a ventral knife-like ridge extending almost its entire length, resembling an adipose fin, but composed of about sixteen paired scales; intromittent organ of the male very long, composed of the first three anal rays, the first divided into two lateral prongs near the tip, each of which has a backward projecting process near its middle and a slender spine-bearing appendage near its base; a similar but larger spine-bearing appendage between the bases of the prongs.

307. **Tomeurus gracilis** Eigenmann. (Plate LXV, figs. 7, 8.)

Tomeurus gracilis Eigenmann, Ann. Carnegie Mus., VI, 1909, 53; Repts. Princeton Univ. Exp. Patagonia, III, 1910, 461.

Type, 31 mm. (Carnegie Museum Catalog of Fishes No. 1093.)

Cotypes, three males, 29–30 mm. Mud creek in Aruka River.

Cotypes, three females, about 20, 24, and 28 mm. Mud creek in Aruka River. (C. M. Cat. No. 1094; I. U. Cat. No. 12076.)

Cotype, one female, 18 mm. Wismar. (C. M. Cat. No. 1095.)

This species represents the type of a new subfamily of Pœciliids.

Head 5.5; depth 6.5; D. 6; A. 6; scales 39 from occiput to tail, seven between the middorsal scale and the ventral ridge; twenty-six scales in front of the dorsal; eye longer than snout, 3.75 in head, a little less than the interorbital.

Very long and slender; mouth rather large, vertical, its width equal to the diameter of the eye; origin of dorsal near beginning of the third fourth of the length, its height equal to length of head less operele; caudal rather pointed, 3.5 in the length; origin of anal a little in advance of the middle, small; intromittent organ of the male one-third of the length, its origin a little in advance of the vertical from the base of the pectoral, extending to the ventral ridge; pectorals equal to their distance from the snout.

Hyaline; a black line from the upper edge of the base of the pectoral to the middle of the caudal; a broader black line along base of the ventral ridge, a few specks below the lateral black line, the scales of the sides above it with a marginal row of chromatophores; scales of back frequently with one or more additional chromatophores, of which a median one is most prominent; upper part of head and area in front of pectorals dotted, the ventral ridge hyaline.

Order **SYNENTOGNATHI.**

Family XVIII. BELONIDÆ.[75]

Potamorrhaphis Günther.

Potamorrhaphis Günther, Catalogue, VI, 1866, 256.

Type, *Belone tæniata* Günther.

Long, needle-shaped fishes with produced snout. Dorsal rays subequal in length, the anterior ones not forming a lobe.

308. **Potamorrhaphis guianensis** (Schomburgk).

Belone guianensis Schomburgk, Fishes Brit. Guiana, II, 1843, 131, pl. 1 (Guiana; Paduiri).

Potamorrhaphis guianensis Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 463.

Belone scolopacina Cuvier and Valenciennes, Hist. Nat. Poiss., XVIII, 1846, 428 (Rio de la Mana, Cayenne).—Günther, Catalogue, VI, 1866, 256 (copied).

Belone tæniata Günther, Catalogue, VI, 1866, 256 (Rio Capin, Brazil).

Potamorrhaphis tæniata Steindachner, "Ichthyologische Beiträge," iii, 1875, 68 (Amazon River at Teffé; Villa Bella; Porto do Moz; Santarem; Gurupa; Hyavary River; Lake Manacapurú, etc.).—Eigenmann, Ann. Carnegie Mus., IV, 1907, 143 (Tuyuyu, Paraguay).

[75] **Tylosurus almeida** Quoy and Gaimard.

Tylosurus guianensis Müller and Troschel (not *Belone guianensis* Schomburgk), in Schomburgk, Reisen, III, 1848, 626 (coast of Guiana).

Belone truncata guianensis Günther, Catalogue, VI, 1866, 245.

Belone almeida Quoy and Gaimard, Voy. Uranie et Physicienne, Zool., 1824, 226 (Brazil).

Tylosurus almeida Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 462.

Belone timucu Cuvier and Valenciennes, Hist. Nat. Poiss, XVIII, 1846, 426 (Rio de Janeiro); not *Esox timucu* Walbaum.

Belone truncata var. *guianensis*, Günther, Catalogue, VI, 1866, 245.

The specimens collected by Schomburgk and referred to by Müller and Troschel are actually this species, not the *Belone guianensis* of Schomburgk.

Eye 3 in the postorbital portion of the head; D. I,12 or 13; A. I,14 or 15; depth at the pectoral 5.5 in the head.

Belone (*Potamorrhaphis*) *tæniata* PERUGIA, Ann. Mus. Genova, (2), XVIII, 1897, 11 (Rio Madidi).

Six specimens, 100–768 mm. Rockstone. (C. M. Cat. No. 2428*a–b*; I. U. Cat. No. 12555.)

Five specimens, 115–218 mm. Konawaruk. (C. M. Cat. No. 2429*a–b*; I. U. Cat. No. 12556.)

Three specimens, 140–168 mm. Tumatumari. (C. M. Cat. No. 2430*a–b*; I. U. Cat. No. 12557.)

Three specimens, 90–212 mm. Gluck Island. (C. M. Cat. No. 2431*a–b*; I. U. Cat. No. 12558.)

Four specimens, 105–220 mm. Wismar. (C. M. Cat. No. 2433*a–b*; I. U. Cat. No. 12560.)

One specimen, 128 mm. Mud-flats below Wismar. (C. M. Cat. No. 2434*a–b*.)

Five specimens, 170–203 mm. Lama Stop-Off. (C. M. Cat. No. 2435*a–b*; I. U. Cat. No. 12561.)

Six specimens, 120–180 mm. Rupununi. (C. M. Cat. No. 2436*a–b*; I. U. Cat. No. 12562.)

Two specimens (damaged). Creek below Potaro Landing. (C. M. Cat. No. 2432*a–b*; I. U. Cat. No. 12559.)

Head 3, depth 6 in the head; D. about 32; A. 27; eye about 7–10 in the snout, 10.5–13.5 in the head, 1.2 in the interorbital.

Lower jaw slightly longer than the upper, ending in a fleshy point; tail compressed; caudal lanceolate; dorsal without a lobe; anal with a lobe, the longest ray about 2.5 the orbit; ventrals not reaching the vent; pectorals about equal to the postorbital part of the eye. Lateral line running low, below the pectoral.

Color very variable in intensity; tail with a median dark brown line, a second less well-defined line below it forward, continued on the sides as a jagged band which extends to the eyes; a reddish line along the sides above this band.

Order **LOPHOBRANCHII.**

Family IX. SYNGNATHIDÆ.

Pipe-fishes.

DORYRHAMPHUS Kaup.

Doryrhamphus KAUP, Cat. Lophobranchiate Fish, 1856, 54 (*excisor*).
Choroidichthys KAUP, Cat. Lophobranchiate Fish, 1856, 54 (*valenciennesi*).
Dorichthys KAUP, Cat. Lophobranchiate Fish, 1856, 56 (*bilineatus*).
Microphis KAUP, Cat. Lophobranchiate Fish, 1856, 63 (*cuneatus*).

Belonichthys PETERS, Mossambique Flussfische, 1868, 109 (*zambizensis*).

Pipe-fishes with the pectoral fin well-developed, the broad pouch a deep groove on the ventral surface between the lateral abdominal keels; ridges distinct; caudal moderate.

309. **Doryrhamphus lineatus** (Valenciennes).

Doryichthys lineatus (*ex* Valenciennes, MS.) KAUP, Cat. Lophobranchiate Fish, 1856, 59 (Bahia; Mexico; Guadeloupe).—POEY, "Synopsis Piscium Cubensium," in Repert. Fis.-Nat. Cuba, 1867, 180 (Cuba).—GÜNTHER, Catalogue, VIII, 1870, 183 (Antilles; Caribbean Sea; Old Calabar; Gaboon).—REGAN, Proc. Zool. Soc. London, 1906, i, 391 (Trinidad).

Doryrhamphus lineatus JORDAN and EVERMANN, Bull. U. S. Nat. Mus. No. 47, 1896, 773.

One specimen, 133 mm. Creek in Mora Passage. (C. M. Cat. No. 2426.)

A second specimen was taken by Dr. Ellis in the harbor at Georgetown.

Head 5+; plates 19 + 24; D. 42; dorsal over 3 + 5 rings;[76] postorbital part of the head 2.5 in the anteorbital. Vent equidistant from caudal and anterior third of opercle.

Lateral line continuous with the ventral angle of the tail; opercle with a median longitudinal ridge and a few radiating ridges on the lower half.

Lower surface of the snout with a pair of dark spots nearer to the snout than to the eye; a dark streak through the eye, becoming wider and diffuse on the sides; back and lower parts much lighter; tail dark chocolate; caudal black, the outer margin white.

Order PERCESOCES.

Family XX. MUGILIDÆ.

Mullets.[77]

Oblong, scaled fishes with two widely separated dorsal fins, the first composed of four spines, the second short; anal short, with two or three graduate spines.

MUGIL Linnæus.[78]

Mugil LINNÆUS, Syst. Nat., ed. 10, 1758, 316.

Type, *Mugil cephalus* Linnæus.

[76] In two specimens from Cuba 3 + 6 and 3 + 7.

[77] Mullets were abundant in the Georgetown market, but it being at the time foreign to plans in hand no efforts were made to get a complete series.

[78] It is more than probable that some species of the genus *Agonostomus* Bennett will be found in Guiana. *Agonostomus monticola* is found on the Island of Trinidad.

Stomach muscular, gizzard-like; teeth ciliiform; lower jaw angular in front; anal spines 3; orbit with a well-developed adipose eyelid, covering part of the iris.

KEY TO THE GUIANA SPECIES OF MUGIL.

a. Soft dorsal and anal fins almost naked; anal rays III,8, rarely III,7 or III,9; caudal deeply forked; sides with dark stripes.

b. Scales 32–36; depth about 4.5 in the length..... **brasiliensis.**

(*bb.* Scales 38–42; depth about 4 in the length..... **cephalus.**)[79]

aa. Soft dorsal and anal fins scaled; anal rays III,9; caudal less deeply forked; sides without dark stripes.

c. Scales 42–45; teeth small..... **incilis.**

cc. Scales 36–39..... **curema.**

310. **Mugil brasiliensis** Agassiz.

Mugil brasiliensis AGASSIZ, Selecta Gen. et Spec. Pisc. Bras., 1829, 234, pl. 72.—JORDAN and EVERMANN, Bull. U. S. Nat. Mus. No. 47, 1896, 811.

Mugil liza CUVIER and VALENCIENNES, Hist. Nat. Poiss., XI, 1836, 83 (Brazil; Porto Rico; Maracaibo; Surinam; Martinique).—MÜLLER and TROSCHEL, in Schomburgk, Reisen, III, 1848, 623 (mouths of rivers).

Mugil lebranchus POEY, Memorias sobre la Historia Natural de Cuba, II, 1861, 260, pl. 18, fig. 3 (Cuba).

No specimens were secured.

311. **Mugil incilis** Hancock.

Mugil incilis HANCOCK, Quart. Journ. Sci., 1830, 127 (Guiana).—JORDAN and EVERMANN, Bull. U. S. Nat. Mus. No. 47, 1896, 812.

Mugil güntheri STEINDACHNER, "Ichthyologische Notizen," i, 1864, 12 (British Guiana).

No specimens were obtained.

312. **Mugil curema** Cuvier and Valenciennes.

Mugil curema CUVIER and VALENCIENNES, Hist. Nat. Poiss., XI, 1836, 87 (Brazil; Martinique; Cuba).—MÜLLER and TROSCHEL, in Schomburgk, Reisen, III, 1848, 623 (mouths of rivers of Guiana).—JORDAN and EVERMANN, Bull. U. S. Nat. Mus. No. 47, 1896, 813.—EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 463.

Mugil petrosus CUVIER and VALENCIENNES, Hist. Nat. Poiss., XI, 1836, 89 (Brazil; Surinam; Gulf of Mexico; Cuba).

[79] No specimens of this species have been recorded from British Guiana. It has been found in St. Vincent and various other points in the islands and along the coast.

Mugil brasiliensis (not of Agassiz) GÜNTHER, Catalogue, III, 1861, 431.—JORDAN and GILBERT, Synopsis Fishes North America, 1883, 403.

Several specimens, the largest 238 mm. Georgetown market. (C. M. Cat. No. 1472*a–c*; I. U. Cat. No. 12399.)

Order PERCOMORPHI.

KEY TO THE FAMILIES OF PERCOMORPHI.

a. Lateral line continued on the tail.
b. Anal spines 2; caudal pointed.....Sciænidæ, XXI.
bb. Anal spines 3; caudal forked.....Centropomidæ, XXII.
aa. Lateral line if present not continued on the tail.
c. Dorsal spines strong, the spinous dorsal continuous with the soft dorsal.
d. Nostrils single; lower pharyngeals united. Lateral line interrupted near the end of the spinous dorsal.....Cichlidæ, XXIII.
dd. Nostrils double; lower pharyngeals separate. No lateral line.....Polycentridæ, XXIV.
cc. Dorsal spines weak, the spinous dorsal not continuous with the soft dorsal.....Gobiidæ, XXV.

Family XXI. SCIÆNIDÆ.

KEY TO THE GENERA OF SCIÆNIDÆ.[80]

a. Teeth not villiform; lower jaw prominent; edge of the preopercle entire; second anal spine weak, adnate to the first ray, the first spine minute or obsolete. (*Otolithinæ*.)
b. Canines not lance-shaped, tapering from the base; anal rays 7 to 13.....Cynoscion.
bb. Canines lance-shaped, widened near the tip, then abruptly pointed, those in the premaxillary largest; about two canines on front of the lower jaw on each side; teeth in outer series of upper jaw somewhat enlarged and lance-shaped.....Macrodon.
aa. Second anal spine usually well-developed and joined to the first ray by a distinct membrane. (*Sciæninæ*.)
c. Lower jaw without barbels.
d. Preopercle without teeth or serrations, its membranaceous margin entire, crenulate or ciliate.
e. Skull excessively cavernous, soft and spongy to the touch; interorbital space very broad; mouth large and oblique; teeth subequal, all villiform, in narrow bands; lower jaw projecting. Pseudobranchiæ developed.....Nebris.
cc. Skull firm, not excessively cavernous; interorbital space not very broad; preorbital not turgid. Teeth not villiform, but more or less unequal, those of the upper jaw biserial, the inner series somewhat enlarged. Scales of the lateral line considerably enlarged, almost entirely concealed by smaller ones. Pseudobranchiæ small, often obsolete on one side. Plagioscion.
dd. Preopercle armed with sharp teeth or serræ. Head very broad; interorbital space flattish and very cavernous. Soft dorsal and anal fins densely scaled. Second anal spine stout. Stelliferus.
cc. Lower jaw with barbels. Lower jaw included, its teeth villiform, in bands.
f. "Pseudobranchiæ well-developed, pectoral fin not elongate."
g. Barbels three, slender, and at the symphysis of the lower jaw; mouth small and inferior; preorbital turgid and cavernous, somewhat translucent; caudal fin rhombic. Preopercle finely serrate.....Pachypops.

[80] This account of the Sciænidæ was prepared by Mrs. Marion Durbin Ellis.

gg. Barbels slender and lateral, along the rami of the jaw. Preorbitals not translucent. Preopercular margin bony and armed with strong teeth.....**Micropogon.**

ff. Pseudobranchiæ obsolete; pectoral fin greatly elongate; chin with two short barbels; soft dorsal with thirty-seven to forty rays.....**Lonchurus.**

Subfamily Otolithinæ.

Cynoscion Gill.

Cestreus Gronow, Cat. Fish., ed. Gray, 1854, 49 (*carolinensis* = *nebulosus*), preoccupied.

Cynoscion Gill, Proc. Acad. Nat. Sci. Phila., 1862, 18 (*regalis*).

Apseudobranchus Gill, Proc. Acad. Nat. Sci. Phila., 1862, 18 (*toe-roe* = *acoupa*).

Atractorcion Gill, Proc. Acad. Nat. Sci. Phila., 1862, 18 (*arquidens*).

Type, *Johnius regalis* Bloch and Schneider.

Key to the Guiana Species of Cynoscion.

a. Scales not very small, the number of transverse series not over ten more than the number of scales with pores in the lateral line. Two of the middle teeth of the upper jaw canine, but not much enlarged. Soft dorsal and anal closely scaled over the basal half to two-thirds only. Caudal fin rhombic. The middle rays considerably produced. Snout short and bluntish, 4.5 in the head. Pectoral 1.5 in the head.....**acoupa.**

aa. Scales very small, the number of pores in the lateral line much less than the number of transverse series. Teeth in upper jaw in a broad band; upper canines quite small. Middle rays of the caudal fin produced.

b. Soft dorsal and anal almost naked; front of head depressed; eye small. Pectorals reaching beyond the ventrals.....**virescens.**

bb. Soft dorsal and anal well covered with scales; mouth very oblique; front of head decidedly compressed; eye moderate. Pectorals reaching two-thirds of the way to the end of ventrals...**steindachneri.**

313. Cynoscion acoupa (Lacépède).

Cheilodipterus acoupa Lacépède, Hist. Nat. Poiss., III, 1802, 546 (Cayenne).

Lutjanus cayennensis Lacépède, Hist. Nat. Poiss., IV, 1802, 196, 245 (Cayenne).

Otolithus rhomboidalis Cuvier, Règne Animal, ed. 2, II, 1829, 173 (Cayenne); based on "Lutjan de Cayenne," Lacépède.

Otolithus toe-roe Cuvier and Valenciennes, Hist. Nat. Poiss., V, 1830, 72, pl. 103 (same type as "Lutjan de Cayenne," Lacépède) (Surinam; Brazil; Lake Maracaibo).—Cuvier and Valenciennes, Hist. Nat. Poiss., IX, 1833, 478.—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 621.

Otolithus cayennensis Günther, Catalogue, II, 1860, 309 (West Indies).

Apseudobranchus toe-roe Gill, Proc. Acad. Nat. Sci. Phila., 1862, 18 (name only).

Cynoscion acoupa Jordan, Proc. U. S. Nat. Mus., 1886, 588 (name only); Bull.

U. S. Nat. Mus. No. 47, 1898, 1403 (Cachiura).—Jordan and Evermann, Rept. U. S. Fish Com. for 1895, 1896, 394 (name only).—Evermann and Marsh, Bull. U. S. Fish. Com. XX, 1902, 215 (name only).—Hargreaves, Fishes of Brit. Guiana, Appendix, 1904, 1.

Cestreus acoupa Jordan and Eigenmann, Rept. U. S. Fish Com. for 1886, 1889, 363 (Cachiura, Brazil).

Seventeen specimens, 75–290 mm. Georgetown market. (C. M. Cat. No. 2481*a–g*; I. U. Cat. No. 12574.)

Head 3.4–3.8; depth 3.8–4; D. X–I, 19–21; A. I or II,8 or 9; scales 55–65 with pores, sixty transverse series above the lateral line; eye 5–5.8 in the head; interorbitals somewhat convex, 4.7 in the head.

Compressed and elongate. Mouth moderate, not very oblique; maxillary very broad, reaching to a vertical from a little beyond the eye, 2.3 in the head. Lower jaw a little protruding. Gill-rakers 4 + 10, the longest 1.5 in the eye. The head covered with cycloid scales; scales of body and vertical fins all ctenoid. Dorsals rather tall; longest dorsal spine 2.1 in the head. Pectorals not reaching the end of ventrals. Color light below, above darker and with very faint longitudinal stripes along the rows of scales; axil pale; spinous dorsal, tips of soft dorsal rays, most of the caudal, and a spot on the lining of the preopercle, dusky.

314. **Cynoscion virescens** (Cuvier and Valenciennes).

Otolithus virescens Cuvier and Valenciennes, Hist. Nat. Poiss., V, 1830, 72 (Surinam).

Cynoscion virescens Jordan, Proc. U. S. Nat. Mus., IX, 1886, 588 (name only).—Jordan and Evermann, Rept. U. S. Fish Com. for 1895, 1896, 395 (name only); Bull. U. S. Nat. Mus. No. 47, II, 1898, 1415 (Victoria, Brazil).—Evermann and Marsh, Bull. U. S. Fish Com., XX, 1902, 215 (name only).

Cestreus virescens Jordan and Eigenmann, Rept. U. S. Fish Com. for 1886, 1889, 371 (Victoria, Brazil).

Otolithus microps Steindachner, Denkschr. Akad. Wiss. Wien, XLI, 1879, 57, pl. 8, fig. 2 (Porto Alegre, Brazil).

Five specimens, 80–105 mm. Georgetown market. (C. M. Cat. No. 2483*a–c*; I. U. Cat. No. 12576.)

Head 3–3.8; depth 4–5.2. D. XI,28; A. I,8. Scales 80 with pores, 125–130, vertical series. Eye 7–8.5 in the head; interorbital very flat, 4–4.5 in the head.

A thickish, spindle-shaped fish, with the body slightly compressed and the head depressed in front; snout rather pointed, 4 in the head. Mouth oblique to

nearly horizontal, lower jaw protruding, maxillary reaching the posterior margin of the eye. Two sharp spines protruding from beneath the entire membranous margin of the preopercle, largest in the smallest specimens. Canines two, prominent in the small specimens. Gill-rakers 4 + 7. Scales all small and cycloid. Lateral line becoming straight in front of the anus. Highest dorsal spine 2 in the head. Last rays of the soft dorsal highest, 2.5 in the head. Caudal equal to the head in the smallest specimen, relatively shorter in larger ones. Pectorals reaching a third of their length beyond the ventrals.

Color light, a little dusky above. Spinous dorsal, caudal, and lining of the opercle dusky. Some silvery color on the head, especially just behind the preopercle.

315. **Cynoscion steindachneri** (Jordan).

Cestreus steindachneri Jordan, Rept. U. S. Fish Com. for 1886, 1889, 372 (Curuca, Brazil).

Three specimens, 325–350 mm. Georgetown market. (C. M. Cat. No. 2482; I. U. Cat. No. 12575.)

Head 3.8–4; depth 4; D. IX or X–1, 20; A. II,8–10; scales 57–64 with pores, 70 or 99 vertical series above the lateral line; eye 5.5–6 in the head; mouth moderate, oblique, maxillary usually just reaching the posterior margin of the eye, maxillary very broad, 2.2–2.4 in the head. Chin prominent, canines in the upper jaw scarcely larger than the surrounding teeth; teeth all small. Gill-rakers 4 + 9. Scales all strongly ctenoid (cycloid on the head of the largest specimen, which is exotic in other respects as well). Soft dorsal and anal heavily scaled. Dorsals scarcely connected by membrane. Highest dorsal spine 1.9 in the head. Caudal rhombic, 1.3 in the head. Ventral extending one-third of its length beyond the end of the pectorals (pectorals extending almost to the end of the ventrals in the exotic specimen).

Color light slaty gray above, with very faint darker longitudinal stripes along the rows of scales. Axil and lining of the preopercle dark. Dorsals and caudal more or less dusky.

The largest specimen, 350 mm., Georgetown market, is quite exotic. The mouth is less oblique; the number of scales is sixty-four with pores in the lateral line and seventy vertical series above it in the exotic one, and fifty-seven pores and ninety-nine series in the two other individuals. The scales of the head are cycloid instead of ctenoid, and the soft dorsal and anal are less densely scaled. Lastly, the pectoral of the exotic specimen nearly reaches the end of the ventral, and is relatively much shorter in the smaller ones.

MACRODON Schinz.

Macrodon SCHINZ, Das Thierreich, II, 1822, 482, revived by Gill, Proc. U. S. Nat. Mus., XXVI, 1903, 1015 (*ancylodon*).

Ancylodon (*ex* Oken) CUVIER, Isis, 1817, 1182 (*jauclidens* = *ancylodon*), not *Ancylodon* Illiger, 1811, a genus of mammals.

Sagenichthys BERG, An. Mus. Nac. Buenos Aires, 1895, 52 (*ancylodon*).

The distinguishing characters of this genus are given in the key. It is represented in British Guiana by the single species:

316. **Macrodon ancylodon** (Bloch and Schneider).

Lonchurus ancylodon BLOCH and SCHNEIDER, Syst. Ichth., 1801, 102 (Surinam).

Ancylodon ancylodon CUVIER and VALENCIENNES, Hist. Nat. Poiss., V, 1830, 81 (Cayenne).—GÜNTHER, Catalogue, II, 1860, 311 (Surinam; West Indies).—JORDAN and EIGENMANN, Rept. U. S. Fish Com. for 1886, 1889, 373 (Rio Grande do Sul).—VAILLANT, Notes Leyden Mus., XX, 1898, 17 (Guyane).

Sagenichthys ancylodon BERG, An. Mus. Nac. Buenos Aires, IV, 1895, 52 (Mar del Plata Montevideo, Maldonado).—JORDAN and EVERMANN, Rept. U. S. Fish Com. for 1895, 1896, 395.—VON IHERING, "Os peixes da Costa do Mar no Estado do Rio Grande do Sul," 1896, 13 (São Paulo).—JORDAN and EVERMANN, Bull. U. S. Nat. Mus. No. 47, II, 1898, 1416 (Rio Grande do Sul).—HARGREAVES, Fishes of Brit. Guiana, Appendix, 1904, 1.

Macrodon ancylodon SCHINZ, Das Thierreich, II, 1822, 482.—EVERMANN and KENDALL, Proc. U. S. Nat. Mus., XXXI, 1903, 1015 (Argentina).—GILL, Proc. U. S. Nat. Mus., XXVI, 1903, 1015.

Ancylodon jaculidens CUVIER and VALENCIENNES, Hist. Nat. Poiss., V, 1830, 81 (Cayenne).—MÜLLER and TROSCHEL, in Schomburgk, Reisen, III, 1848, 621.—GÜNTHER, Catalogue, II, 1860, 311 (Surinam; West Indies).—JORDAN and GILBERT, Bull. U. S. Fish Com., II, 1882, 111 (Panama).—PELLEGRIN, Revue Coloniale, 1908, 590 (Guiane francaise).

Ancylodon atricauda GÜNTHER, Rept. Challenger Exp., Zoology, I, vi, 1880, 12 (mouth of Rio de la Plata).

Seven specimens, 195–270 mm. Georgetown market. (C. M. Cat. No. 2484*a–d*; I. U. Cat. No. 12577.)

Two specimens, young (?), 67 and 86 mm. Georgetown market. (C. M. Cat. No. 2485*a*; I. U. Cat. No. 12578.)

Head 3–3.25; depth 4; D. IX–I,27–29; A. II,9 or 10; scales "75 with pores 85 series"; eye 5.5–6.5 in the head; interorbital flattish, a little wider than the eye, 5 in the head.

Moderately compressed; dorsal profile nearly straight to slightly convex; membranous margin of the preopercle fimbriate. Mouth oblique; snout rather pointed, 4.5 in the head; maxillary of moderate width, reaching a little beyond the eye, 2.3 in the head. The two very large canines of the upper jaw, the two smaller ones on either side of the lower jaw in front, and the five or six small teeth near the front of the upper jaw, all lance-shaped, *i. e.*, widened towards the tip and then abruptly pointed. The other teeth, a row down the edge of the maxillary, and an inner row of the lower jaw, all flat and very sharp. Gill-rakers 3 + 8, rather slender, the longest not less than 1.5 in the eye, each with a row of a dozen or more stout-conical spines down the posterior mesial aspect. Scales all small and cycloid; the soft dorsal and anal very densely and completely covered with scales; pectorals and ventrals somewhat scaled.

Lateral line becoming straight a considerable distance in front of the vent. Spinous dorsal very weak, the longest spine 2.8 in the head. Anal spines very small; anal high, 2.3 in the head. Pectorals much larger than the ventrals, reaching a third of their own length beyond the latter, 1.3 in the head.

Color light, much darker above; lower part of the head and a region along the lateral line silvery. Spinous dorsal, tips of soft dorsal and caudal rays dusky. A dusky spot on the under side of the pectoral, on the axil, and on the lining of the preopercle.

The two small specimens (probably the young of *Macrodon ancylodon*) differ from the larger ones in several respects. The head is relatively much deeper, the lower jaw being more prominent, its lower end forming a sharp angle with the ventral profile. The four or five large lanceolate canines of the lower jaw are larger than the two canines of the upper jaw, and project up over the upper jaw onto the snout. Eye 4.5 in the head.

Subfamily Sciæninæ.

Nebris Cuvier and Valenciennes.

Nebris Cuvier and Valenciennes, Hist. Nat. Poiss., V, 1830, 149 (*microps*).

Type, *Nebris microps* Cuvier and Valenciennes.

Skull excessively cavernous and soft; interorbitals very broad; lower jaw projecting; teeth all villiform, in broad bands; eye very small; margin of the preopercle very broad, membranous and fringed. Slits and pores on the upper jaw not conspicuous. Pseudobranchiæ developed. Soft dorsal, caudal, and anal well scaled. Dorsal and anal spines weak. (Vertebræ 10 + 14.)

Here represented by *Nebris microps*.

317. **Nebris microps** Cuvier and Valenciennes.

Nebris microps Cuvier and Valenciennes, Hist. Nat. Poiss., V, 1830, 149, pl. 112 (Surinam).—Günther, Catalogue, II, 1860, 316 (copied).—Steindachner, "Ichthyologische Beiträge," iv, 1875, 10 (Bay of Panama).—Jordan and Gilbert, Bull. U. S. Fish Com., II, 1882, 111 (Panama).—Jordan and Eigenmann, Rept. U. S. Fish Com. for 1886, 1889, 374 (Panama).—Jordan and Evermann, Rept. U. S. Fish Com. for 1895, 1896, 395 (name only).—Vaillant, Bull. Mus. d'Hist. Nat., III, 1897, 124.—Jordan and Evermann, Bull. U. S. Nat. Mus. No. 47, II, 1898, 1417.—Vaillant, Notes Leyden Mus., XX, 1898, 17–20 (Guyane); Nouv. Arch. Mus. d'Hist. Nat., (4), II, 1900, 135 (Surinam).—Hargreaves, Fishes of Brit. Guiana, Appendix, 1904, 2.

Seven specimens, 200–314 mm. Georgetown market. (C. M. Cat. No. 2469*a–d*; I. U. Cat. No. 12567.)

Head 3–3.5; depth 4; D. VIII–I,32 to 34; A. II,11; scales 50 with pores, 100 above the lateral line to the base of the caudal; eye 9.5–10 in the head; interorbital region very broad, convex, 3–3.2 in the head.

Compressed, elongate; head very thick. Mouth very large and oblique. Lower jaw prominent; teeth villiform, in several series above, in two or more series below. Gill rakers 7 + 15. Scales generally cycloid, but somewhat ctenoid over the body cavity in the larger specimens. Scales along the lateral line running to the end of the caudal rays not enlarged. Soft dorsal, anal, and caudal much thickened with small scales. Spinous dorsal very weak; anal spines almost indistinguishable.

Color light, silvery on the head. Five broad, dusky bands across the back and sides, above the lateral line, quite distinct in the large specimens, only indicated in the smaller ones. Spinous dorsal, tips of soft dorsal rays, more or less of the caudal, tips of the anal rays, tips of the ventrals and inner side and tips of the pectorals, all dusky. Axil dusky in adults.

Plagioscion Gill.

Plagioscion Gill, Proc. Acad. Nat. Sci. Phila., 1861, 82 (description of genus only).

Diplolepis Steindachner, "Sciaenoiden Brasiliens," etc., in SB. Akad. Wiss. Wien, XLI, 1863, 2 (*squamosissimus*) (name preoccupied in Hymenoptera).

Plagioscion Jordan and Eigenmann, Rept. U. S. Fish Com. for 1886, 1889, 380 (*squamosissimus*).

Type, *Sciæna squamosissima* Heckel.

A genus of fresh-water fishes in the rivers of South America, separated from

all other Sciænidæ by the squamation of the lateral line. (See key to genera.) Here represented by *Plagioscion auratus* and *P. squamosissimus*.

KEY TO THE GUIANA SPECIES OF PLAGIOSCION.

a. Second anal spine very large, 2 or 3 in the head.....auratus.
aa. Second anal spine short, but little longer than the eye.....squamosissimus.

318. Plagioscion auratus (Castelnau).

Johnius auratus CASTELNAU, Anim. Am. Sud, Poiss., 1855, 12, pl. 4, fig. 2 (Rio Ucayali).

Sciæna aurata GÜNTHER, Catalogue, II, 1860, 287 (copied).

Plagioscion auratus JORDAN and EIGENMANN, Rept. U. S. Fish Com. for 1886, 1889, 383.—EIGENMANN, Proc. U. S. Nat. Mus., XIV, 1891, 67 (rivers of Brazil; name only).—GŒLDI, Bol. Mus. Pará., II, 1898, 464 (Magoary).—EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 468.

One specimen, 175 mm. Georgetown market. (C. M. Cat. No. 2470*a*.)

Head 3.3; depth 3.4; D. X–I,34; A. II,7; scales 50 with pores, 60 oblique series above the lateral line; eye 6 in the head; interorbital wider than the eye, 4 in the head.

Compressed; dorsal profile very convex, ventral nearly straight. Head very convex above, not spongy; snout bluntish, 4 in the head; maxillary 2.25 in the head; mouth large, lower jaw included; teeth of the upper jaw subequal, but larger than those of the lower jaw. None of the teeth of the lower enlarged. Gill-rakers 6 + 12. Scales ctenoid; basal one-third of the soft dorsal scaled. Caudal rhombic; pectoral not as long as the ventral; ventral with a filamentous tip reaching to just beyond the anus. Second anal spine very strong, 2 in the head.

Silvery, a little brownish above; most of the spinous dorsal, tips of the soft dorsal, and most of the caudal dusky; axil and a small patch on the inside of the opercle dusky.

319. Plagioscion squamosissimus Heckel.

Plagioscion squamosissimus HECKEL, Ann. Wiener Mus., II, 1840, 438.—REINHARDT, Vidensk. Med. Naturhist. For. Kjöbenhavn, 1854, 108.—JORDAN and EIGENMANN, Rept. U. S. Fish Com. for 1886, 1889, 381 (Obidos; Coary).—JORDAN and EVERMANN, Bull. U. S. Nat. Mus. No. 47, II, 1898, 1418 (Obidos).—EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 468.

Pachyurus squamosissimus GÜNTHER, Catalogue, II, 1860, 526 (copied).

Sciæna squamosissima STEINDACHNER, "Flussfische Südamerika's," i, 1879, 3 (Amazon; Orinoco; Rio Negro).

Diplolepis squamosissimus Steindachner, "Sciænoiden Brasiliens," etc., in SB. Akad. Wiss. Wien, XLI, 1863, 2.

Sciæna rubella Schomburgk, Fishes Brit. Guiana, II, 1843, 133 (rivers of Guiana).

Johnius crouvina Castelnau, Anim. Am. Sud, Poiss., 1855, 11, pl. 5, fig. 1 (Rio Crixas; Rio Araguay).

Sciæna crouvina Günther, Catalogue, II, 1860, 287 (copied).

Johnius amazonicus Castelnau, Anim. Am. Sud, Poiss., 1855, 12, pl. 4. fig. 1 (Amazon).

Sciæna amazonica Günther, Catalogue, II, 1860, 284 (Rio Capin, Pará).

? *Corvina monacantha* Cope, Trans. Am. Philos. Soc., XIII, 1866, 402 (near Paramaribo, Dutch Guiana).

? *Sciæna monacantha* Jordan, Proc. U. S. Nat. Mus., IX, 1886, 587 (name only).

One specimen, 570 mm. Falls of the Mazaruni. (C. M. Cat. No. 2493*a*.)

Head 3.1; depth 3.2; D. X–I,29–36; A. II,5–7; scales with pores about 50, with about one hundred oblique series above the lateral line; eye 5.5 in the head; interorbital a little larger than the eye, 4.5 in the head.

Head at the base of the occipital process 1.2 in the greatest depth. Snout moderately short, 4.5–5 in the head. Mouth large, upper end of the maxillary on the level of the lower margin of the eye. Maxillary 2.3 in the head, reaching to just beyond the eye. Teeth of the upper jaw about equal to those of the inner series of the lower jaw. Gill-rakers rather long, 10 + 12. Pseudobranchiæ small or lacking on one side. Scales ctenoid. Soft dorsal and caudal all but covered with scales; caudal convex. Pectorals longer than the ventrals, 1.6 in the head. Ventrals without elongate filamentous tips in this large specimen. Second anal spine inconsiderable, very little longer than the eye, 4.5–5.5 in the head. Anal small.

Silvery, darker above; a large dark spot in the axil, prolonged obliquely downward and backward to beneath the ventrals. Dorsals, caudal, and proximal half of the pectorals dark.

Stellifer Cuvier.

"Les Stelliferes" Cuvier, Règne Animal, ed. 1, 1817, 283.

Stellifer (*ex* Cuvier) Oken, Isis, 1817, 1182 (*stellifer*).

Stelliferus Stark, "Elements Nat. Hist., I, 459, 1828" (*stellifer*) (*fide* Gill).

Hamoprion Holbrook, Ichth. South Carolina, ed. 1, 1856, 188 (*lanceolata*).

Type, *Bodianus stellifer* Bloch.

The genus is characterized, as indicated in the key to the genera, by a remarkably spongy and cavernous structure of the bones of the head; the septa are very thin.

Interorbital space very broad and flat. Preopercle with spines or serræ on the free margin. Anal and soft dorsal well scaled. The single species, *S. rastrifer* Jordan, was taken in fresh water at Mahaica.

320. **Stellifer rastrifer** Jordan and Eigenmann.

Stellifer rastrifer Jordan and Eigenmann, Rept. U. S. Fish Com. for 1886, 1889, 393.—Jordan and Evermann, Bull. U. S. Nat. Mus. No. 47, II, 1898, 1441 (name only).

Seven specimens, 45–133 mm. Georgetown market. (C. M. Cat. No. 2472*a–d*; I. U. Cat. No. 12569.)

One specimen, 72 mm. Mahaica. (C. M. Cat. No. 2473*a*.)

Head 3–3.3; depth 3–3.2; D. XI–I,21 or 22; A. II,8 or 9; scales 49–50 (pores), four in vertical series above and seven in vertical series below the lateral line; eye nearly round, 4–4.25 in the head; interorbital nearly flat, 1.5 times the eye, 3 in the head.

Compressed; snout short and blunt, 4.3 in the head; preopercle strongly rounded, with but two spines, the upper directed backwards, the lower more or less downwards. Mouth large, a little oblique; the lower jaw included; maxillary reaching the posterior margin of the eye. Second anal spine enlarged, 1.9–2.2 in the head. Gill-rakers 14 + 25, very long and slender.

Color light; membrane of the spinous dorsal and tips of the anal rays blackish on the inner side, a dark spot just beneath the upper edge of the dorsal fin. Caudal and soft dorsal somewhat dusky. Scales and upper part of the sides outlined with dusky. Large chromatophores scattered over the top of the head, snout, and middle of the sides. Inside of opercle with a large blackish spot.

Pachypops Gill.[81]

Pachypops Gill, Proc. Acad. Nat. Sci. Phila., 1861, 87.

Type, *Micropogon trifilis* Müller and Troschel.

A fresh-water genus, very close to *Pachyurus*, from which it is distinguished by the barbels on the chin. Represented in this region by two species, which may be separated as follows.

[81] The type of the species of *Pachypops trifilis* Müller and Troschel (1848) from Guiana has been kindly examined for us by Dr. P. Poppenheim, Königl. Zoologischen Museum, Berlin. From his descriptions and the original descriptions of Müller and Troschel we believe their *P. trifilis* to be synonymous with *P. furcræus* Lacépède (1802), which means that Steindachner's *P. trifilis* was probably new and not the *P. trifilis* of Müller and Troschel.

KEY TO THE GUIANA SPECIES OF PACHYPOPS.

a. Soft dorsal rays 25–27; second anal spine enlarged, 1.2–1.5 in the longest anal rays. Sides and back without large dark spots..... furcræus.

aa. Soft dorsal rays 30–32; the one anal spine scarcely heavier than the dorsal spines, 3.1 in the head. Sides and back with dark spots..... grunniens.

321. Pachypops furcræus (Lacépède).

Perca furcræa LACÉPÈDE, Hist. Nat. Poiss., IV, 1802, 398, 424 (Surinam).

Corvina furcræa CUVIER and VALENCIENNES, Hist. Nat. Poiss., V, 1830, 111 (same type).

Pachypops furcræus STEINDACHNER, "Sciænoiden Brasiliens," etc., in SB. Akad. Wiss. Wien, XLI, 1863, 7, pl. 1 (Rio Negro).—JORDAN and EIGENMANN, Rept. U. S. Fish Com. for 1886, 1889, 413 (Rio Negro).—EIGENMANN, Proc. U. S. Nat. Mus., XIV, 1891, 67 (Amazons; name only); Repts. Princeton Univ. Exp. Patagonia, III, 1910, 468.—BERG, An. Mus. Nac. Buenos Aires, IV, 1895, 53 (Montevideo).—JORDAN and EVERMANN, Rept. U. S. Fish Com. for 1895, 1896, 399 (name only); Bull. U. S. Nat. Mus. No. 47, II, 1898, 1459 (same specimens as Jordan and Eigenmann).—EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 468.

Pachyurus furcræus STEINDACHNER, "Ichthyologische Beiträge," viii, 1879, 12 (Surinam; Rio Trombetas; Amazon, near Cameta).

Corvina biloba CUVIER and VALENCIENNES, Hist. Nat. Poiss., V, 1830, 112 (habitat not known).

Pachypops biloba STEINDACHNER, "Ichthyologische Notizen," i, 1864, 7 (Surinam).

One specimen, 193 mm. Creek in Mora Passage. (C. M. Cat. No. 2474.)

Three specimens, 56, 76, and 132 mm. Wismar. (C. M. Cat. No. 2475*a*; I. U. Cat. No. 12570.)

Nine hundred eighteen specimens, 31–121 mm. Bartica sand-bank. (C. M. Cat. No. 2476*a–z*; I. U. Cat. No. 12571.)

Head 2.9–3.4; depth 3.5–3.8; D. X–I,25–27; A. II,6; about fifty-eight pores in the lateral line, fifty-two oblique series above the lateral line, eleven scales in an almost vertical series between the front of the soft dorsal and the lateral line; width of eye 1.25 in its length, length of eye 2.9–3.1 in the head. Interorbital 1.5 in the eye.

Compressed; elongate; dorsal profile convex; interorbital flattish; snout blunt, scarcely equal to the eye. Bones of the head very cavernous and translucent; preorbital turgid, overhanging the very small inferior mouth. Maxillary entirely concealed when the mouth is closed, just reaching the anterior margin of the pupil.

Preopercle somewhat cavernous, its posterior border serrate, with about fourteen small spines. Teeth minute and villiform. Gill-rakers 9 + 13 to 15, short and slender, with two rows of very small spines on each.

Scales ctenoid, except on the snout and front of cheeks. Top of head without a regular series of median scales. Caudal scaled only at the base in small specimens, almost entirely covered with scales in the largest specimen (193 mm.). Soft dorsal scaled over the proximal one-half, the scales ctenoid and in single series between the rays; anal scaled over the basal one-third of the anterior half. Lateral line becoming straight over the last anal rays.

Longest dorsal spine 1.5 in the head; soft dorsal high, 2.8 in the head. Caudal rhombic, 1.3 in the head in adults, middle rays and rays just below the middle elongate in the young. Second anal spine very large and strong, 1.9 in the head; longest anal ray 1.7 in the head. Pectorals and ventrals about equal, 1.5 in the head; first ventral ray with a short filamentous projection.

Ground-color brownish, dark above, especially in large specimens. A round dusky spot on the opercle just in front of the anterior end of the lateral line, less distinct in large specimens. Axil dusky. Numerous chromatophores scattered over the body, opercle, and cheeks. Membrane of the spinous dorsal nearly black in large specimens; tips of the soft dorsal rays blackish; a dark stripe along the outer half of the soft dorsal, interrupted by the colorless rays. Caudal dusky where scaled; anal and ventrals sometimes dusky. A small brownish bar near the edge of each scale rarely gives the appearance of undulating or oblique stripes. Base of scales above the lateral line silvery in young specimens, light steel-blue in adults. Scales below the lateral line with a yellow or copper tinge just above the front of the anal. Young specimens with the caudal, a narrow area along the back, and the upper half of the iris, sunset-red in life.

322. **Pachypops grunniens** (Schomburgk).

Corvina grunniens Schomburgk, Fishes Brit. Guiana, II, 1843, 136 (Essequibo).

Pachypops grunniens Jordan and Eigenmann, Rept. U. S. Fish Com. for 1886, 1889, 414 (name only).

One specimen, 163 mm. Tumatumari. (C. M. Cat. No. 2478.)

Three specimens, 52–68 mm. Crab Falls. (C. M. Cat. No. 2477*a*; I. U. Cat. No. 12572.)

Head 3–3.2; depth 3.9–4.25; D. X–I,30–32; A. I,7; scales 57 with pores, 63 oblique series above the lateral line; eye large, its width 1.25 in its length, its length 3–3.2 in the head; interorbital 1.5 in the eye.

Compressed and elongate; dorsal profile lower than in *P. furcræus;* interorbital flattish, equal to or a little broader than the length of the eye. Suborbitals, preorbitals, and preopercle cavernous and translucent; preorbitals turgid, overhanging the very small, inferior mouth; maxillary concealed when the mouth is closed, barely reaching the anterior margin of the eye. Posterior border of the preopercle finely serrate; snout rather pointed, distinctly longer than the eye. Teeth all minute and villiform. Gill-rakers 21 + 8 or 9, short, slender, and simple.

Scales ctenoid, except on the suborbitals, snout, and mental region, where they are cycloid; middorsal series of the head complete, the scales somewhat enlarged. Caudal almost completely covered with scales in adult, thinly scaled over the basal half in young specimens. Soft dorsal with scales on the basal one-fourth to two-thirds. Anterior third of the anal with scales on the basal portion. Lateral line little arched, becoming straight half-way between the last dorsal and last anal rays.

Highest dorsal spine 1.5–2 in the head; soft dorsal high, 2.5–3 in the head. Caudal rhombic, 1.3 in the head in adults, more pointed in small specimens. Anal with but one spine, which is scarcely heavier than the dorsal spines, 3.1 in the head. Pectorals slightly longer than the ventrals, 1.5 in the head. Ventrals without filaments.

Ground-color greenish yellow, only a little darker above. Small specimens with five to eight large, diffuse, dusky spots along the back and sides, the first just in front of the spinous dorsal, a similar second series of five or six spots along the lateral line, and a single spot on the opercle. Traces of the uppermost series of these spots are retained in the adult. A number of small, flake-like, dark brown spots in the region just below the spinous dorsal are present only in the large specimen; while only the smaller specimens have the numerous large chromatophores on the snout and lower two-fifths of the sides. Distal half of the spinous dorsal and the tips of all of the soft dorsal and caudal rays black; a very small black bar on the base of each dorsal spine and a similar bar just above the base on each ray of the soft dorsal; in addition to these fin-markings the large specimen has a narrow black stripe, broken by the colorless rays through the middle of the anterior two-thirds of the soft dorsal, and a series of black spots just in front of the third, fourth, and fifth dorsal spines at one-fourth of the distance from their bases. All scales with a pale silvery iridescence.

This species resembles *P. adspersus* in its fin-rays and the spotted condition of the dorsal, but differs from it especially in the size of the anal spine and arrangement of the spots on the sides.

It is a *Pachypops* with a spotted dorsal, and coming as it does from the Essequibo is probably, as suggested by Jordan and Eigenmann (1889), the *Corvina grunniens* of Schomburgk. However, the meager description given by Schomburgk makes positive identification very difficult.

Micropogon Cuvier and Valenciennes.

Micropogon Cuvier and Valenciennes, Hist. Nat. Poiss., V, 1830, 213 (*lineatus* = *furnieri*).

Type, *Micropogon lineatus* Cuvier and Valenciennes = *Umbrina furnieri* Desmarest.

Micropogon is a well-marked genus of closely related species with a row of minute barbels on each ramus of the lower jaw near the symphysis; the margin of the preopercle is strongly serrate. Teeth in villiform bands, the outer row of the upper jaw enlarged. Caudal fin doubly truncate in the adult. Represented in this collection by the single, widely distributed species,

323. **Micropogon furnieri** (Desmarest).

Umbrina furnieri Desmarest, Premiere Decade Ichth., 1823, 22, pl. 2, fig. 3 (Cuba).

Micropogon furnieri Jordan, Proc. U. S. Nat. Mus., VII, 1884, 37 (Havana).—Bean and Dresel, Proc. U. S. Nat. Mus., VII, 1884, 157 (Jamaica).—Jordan, Proc. U. S. Nat. Mus., IX, 1886, 44 (Havana).—Jordan and Eigenmann, Rept. U. S. Fish Com. for 1886, 1889, 418 (Cuba and Rio Janeiro).—Jordan and Evermann, Bull. U. S. Nat. Mus. No. 47, II, 1898, 1462 (Havana).—Berg, An. Mus. Nac. Buenos Aires, IV, 1895, 55 (Montevideo).—Lahille, Rev. Mus. la Plata, VI, 1895, 8 (Puerto Vieja; Puerto La Plata).—Jordan and Evermann, Rept. U. S. Fish Com. for 1895, 1896, 399 (name only).—von Ihering, "Os Peixes da Costa do Mar no Estado do Rio Grande do Sul," 1896, 12 (Lagoa dos Patos).—Delfin, Revista Chilena Hist. Nat., 1901, 69.—Evermann and Marsh, Bull. U. S. Fish Com., XX, 1902, 220 (San Juan and Arecibo).

Micropogon lineatus Cuvier and Valenciennes, Hist. Nat. Poiss., V, 1830, 218, pl. 119 (Brazil; Porto Rico; Havana).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 621.

Micropogon argenteus Cuvier and Valenciennes, Hist. Nat. Poiss., V, 1830, 218 (Surinam).

Micropogon undulatus Günther, Catalogue, II, 1860, 271 (in part, not *Perca undulata* L.) (Surinam; Bahia; Guatemala; Cuba; Jamaica).—Poey, Repert.

Fis.-Nat. Cuba, II, 1868, 325 (Cuba).—Günther, Trans. Zool. Soc. London, VI, 1868, 387 (Atlantic coast of Central America).—Poey, "Enumeratio Piscium Cubensium," in An. Soc. Esp., IV, 1875, 121 (Cuba).—Günther, Ann. and Mag. Nat. Hist., (5), VI, 1880, 9 (Rio Plata).—Poey, "Fauna Puerto Riquena," in An. Soc. Esp., X, 1881, 325 (Porto Rico).—Perugia, Ann. Mus. Genova, (2), X, 1891, 313.

One specimen, 335 mm. Georgetown market. (C. M. Cat. No. 2480*a*.)

Twelve specimens, 49–106 mm. Georgetown market. (C. M. Cat. No. 2471*a–d*; I. U. Cat. No. 12568*a–d*.)

Head 3.2; depth 3.3; D. X–I,26 to 30; A. II,7 or 8; scales 54 with pores; eye 6 in the head in the adult, about 4.5 in the young; interorbital 4 in the head.

Compressed; dorsal profile convex, ventral profile nearly straight; snout somewhat bluntish, 3.1 in the head. Posterior nares on the same horizontal as the lower edge of the iris. Teeth in broad villiform bands, the outer row of the upper jaw only very little enlarged, even in the large specimen. Gill-rakers about 8 + 12.

Scales of the breast, and at least the sides of the head, cycloid, those of the side and back and top of the head in the young etenoid. Fins naked, except the base of the caudal. Dorsal high, longest spine 2 in the head; second anal spine moderate, 4.3–5 in the head in the adult, 2.8 in the young. Caudal double truncate in the adult, elongate in the young. Pectorals long, reaching beyond the ventrals, 1.3 in the head; ventrals filamentous, 1.5 in the head.

Color silvery all over, the dark spots above the lateral line forming continuous streaks along the rows of scales which are nearly as wide as the interspaces; the short vertical bars crossing the lateral line are clear but very faint in the large specimens and faint but not so clear in the young. The axil and a small patch on the lining of the opercle are pale dusky. Small specimens have the distal half of the dorsals and caudal somewhat dusky, as well as a small dark spot at the base of each dorsal ray and spine.

Lonchurus Bloch.

Lonchurus Bloch, Ichthyologia, 1793, pl. 360 (*barbatus* = *lanceolatus*).

Lonchiurus Jordan and Evermann, Bull. U. S. Nat. Mus. No. 47, II, 1895, 1481.

A genus of but one species, without close relatives.

324. **Lonchurus lanceolatus** Bloch.

Lonchurus lanceolata Bloch, Nov. Act. Sci. Copenhagen, III, 1788, 383 (India).

Lonchurus lanceolatus Günther, Catalogue, II, 1860, 317 (copied).—Jordan and Eigenmann, Rept. U. S. Fish Com. for 1886, 1889, 434 (copied).

Lonchurus barbatus Bloch, Ichthyologia, 1793, pl. 360 (?).—Bloch and Schneider, Syst. Ichth., 1801, 102 (Surinam).—Cuvier and Valenciennes, Hist. Nat. Poiss., V, 1830, 193 (described from Bloch's type).

Lonchurus depressus Bloch and Schneider, Syst. Ichth., 1801, 102 (Surinam).—Cuvier and Valenciennes, Hist. Nat. Poiss., V, 1830, 195 (copied).—Günther, Catalogue, II, 1860, 317 (West Indies).

Lonchiurus lanceolatus Jordan and Evermann, Bull. U. S. Nat. Mus. No. 47, II, 1895, 1481 (copied from Cuvier and Valenciennes).

Longchurus lanceolatus Hargreaves, Fishes of Brit. Guiana, Appendix, 1904, 2.

Two specimens, 107–168 mm. Georgetown market. (C. M. Cat. No. 2478; I. U. Cat. No. 12573.)

Head 3.6–3.8; depth 4.5–4.8; D. X or XI–I,37–40; A. II,7 or 8; scales 60–70 with pores, about fifty-five oblique series above the lateral line. Eye small, 8 in the head; interorbital broad, very slightly convex, 2.5 times the eye, 3.5 in the head. Body compressed, elongate; head depressed; dorsal profile elevated to origin of dorsal; snout twice the length of the eye, rounded, with a conspicuous median pore; mouth moderately large, inferior, nearly horizontal; lower jaw included; maxillary only partially concealed, extending the length of the eye behind the eye. Preopercle somewhat cavernous, with entire bony margin; preorbitals cavernous and turgid; suborbitals cavernous. Chin with two slender barbels a little longer than the eye. Teeth in narrow villiform bands, a little larger above than below, lacking at the symphysis of the premaxillaries. Pseudobranchiæ obsolete.

Gill-rakers 5 + 13, with two irregular rows of minute spines directed backwards.

Scales mostly ctenoid; head, except mental region, well covered with scales; most of the scales of the breast and below the pectorals, as far back as the middle of the ventrals, cycloid. First two series below the dorsals, the short dorsal sheath, and the scales which cover the basal one-third of the soft dorsal, cycloid; the scales at the base of the anal and caudal and those which cover the basal half of the caudal are likewise cycloid. Anal naked. Lateral line suddenly decurved, becoming straight over the anal.

Dorsal and anal spines weak; last dorsal rays longest, 2.5 in the head. Caudal long and pointed, 3.2 in the length (2.1 in the small specimens). Pectoral very long, 1.5 times the head without the upper ray, which is very elongate, 1.75 in the length in the large specimen, 2.25 in the small one. Ventrals rather small, 2 in the head without the first ray, which is very elongate (being described by Bloch as reaching the anal), 1.5 in the head in the larger of the present specimens.

Ground-color light brown, only a little darker above; everywhere, except on the lower part of the head and at the base of the pectoral, thickly peppered with dark chromatophores. Pectoral intensely black; caudal and spinous dorsal also black; anal, soft dorsal, and mid-ventral rays very dusky. Two innermost and the elongate outer rays of the ventral creamy. Lining of the operele blackish. Scales above the lateral line outlined with dusky.

Family XXII. CENTROPOMIDÆ.

Centropomus Lacépède.

Centropomus Lacépède, Hist. Nat. Poiss., IV, 1802, 248 (sp.).—Cuvier and Valenciennes, Hist. Nat. Poiss., II, 1828, 102 (*undecimalis*).

Oxylabrax Bleeker, Arch. Neérl. Sci. Nat., XI, 1876, 264 (*undecimalis*).

Macrocephalus (*ex* Browne) Bleeker, Arch. Neérl. Sci. Nat., XI, 1876, 336 (*undecimalis*).

Type, *Sciæna undecimalis* Bloch.

Elongate fishes, with a pointed snout and projecting lower jaw.

Scales etenoid, lateral line conspicuous, continued on the middle caudal rays; caudal forked; head depressed, lower jaw projecting; the second anal spine large.

Key to the Guiana Species of Centropomus.

a. Preorbital smooth or with fine teeth; second anal spine scarcely longer than the third, not reaching beyond the tip of the first soft ray, not nearly reaching caudal. Maxillary extending beyond the middle of the eye. Lateral line black; lower caudal lobe dusky; sides silvery or dusky. About sixty-five pores in the lateral line..... **undecimalis.**

aa. Preorbitals with retrorse spines; second anal spine much longer than the third, extending far beyond the tip of the first soft ray, reaching the caudal. Maxillary not extending beyond the middle of the eye. Lateral line not black; sides silvery. About fifty pores in the lateral line..... **ensiferus.**

325. **Centropomus undecimalis** (Bloch).

Sciæna undecimalis Bloch, Ausl. Fische, VI, 1792, 60, pl. 303.

Platycephalus undecimalis Bloch and Schneider, Syst. Ichth., I, 1801, 59.

Centropomus undecimalis, part, Cuvier and Valenciennes, Hist. Nat. Poiss., II, 1828, 102, pl. 14 (Rio de Janeiro; Lima; St. Domingo; Martinique).—Günther, Catalogue, I, 1859, 79 (Bahia; Pernambuco; Surinam; Demerara; Santo Domingo; Jamaica).

Centropomus undecimalis Guicheneau, in la Sagra, Hist. Cuba, Poiss., 1853, 9.—Vaillant and Bocourt, Miss. Sci. au Mex. et dans l'Am. Cent., Poiss., 1874, 17, pl. 2, fig. 1.—Steindachner, "Fisch-Fauna Magdalenen-Stromes," 1878, 5.—Jordan and Gilbert, Synopsis Fishes North America, 1882, 528.—Ever-

mann and Kendall, Bull. U. S. Fish Com. XII, 1894, pl. 37.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 466.

Centropomus undecim-radiatus, Lacépède, Hist. Nat. Poiss., IV, 1802, 268.

Perca loubina Lacépède, Hist. Nat. Poiss., IV, 1802, 418.

Sphyræna aureoviridis Lacépède, Hist. Nat. Poiss., V, 1803, 327, pl. 9, fig. 2.

Centropomus appendiculatus Poey, Mem. sobre la Hist. Nat. Cuba, II, 1858, 119; Repert. Fis.-Nat. Cuba, II, 1868, 280.

Centropomus appendiculatus, part, Günther, Trans. Zool. Soc. London, VI, 1868, 406.

Eleven specimens, 55–345 mm. Georgetown market. (C. M. Cat. No. 2423*a–d*; I. U. Cat. No. 12553.)

326. Centropomus ensiferus Poey.

Centropomus undecimalis, part, Günther, Catalogue, I, 1859, 79.

Centropomus ensiferus Poey, Mem. sobre la Hist. Nat. Cuba, II, 1858, 122, pl. 12, fig. 1.—Günther, Trans. Zool. Soc. London, VI, 1868, 408.—Vaillant and Bocourt, Miss. Sci. au Mex. et dans l'Am. Cent., Poiss., 1874, 33.—Steindachner, "Fisch-Fauna Magdalenen-Stromes," 1878, 21.—Jordan, Proc. U. S. Nat. Mus., IX, 1886, 39.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 466.

Centropomus armatus Gill, Proc. Acad. Nat. Sci. Phila., 1863, 163.—Günther, Trans. Zool. Soc. London, VI, 1868, 408.—Vaillant and Bocourt, Miss. Sci. au Mex. et dans l'Am. Cent., Poiss., 1874, 34, pl. 1 *ter*, fig. 2.

Centropomus affinis Steindachner, "Ichthyologische Notizen," i, 1864, 1, pl. 1, fig. 1.—Vaillant and Bocourt, Miss. Sci. au Mex. et dans l'Am. Cent., Poiss., 1874, 31, pl. 1, fig. 1.

Centropomus brevis Günther, Proc. Zool. Soc. London, 1864, 145.—Vaillant and Bocourt, Miss. Sci. au Mex. et dans l'Am. Cent., Poiss., 1874, 36.

Centropomus scaber Bocourt, Ann. Sci. Nat., Zoologie, (5), IX, 1868, 90.

Centropomus robalito Jordan and Gilbert, Proc. U. S. Nat. Mus., IV, 1882, 462.

Eleven specimens, 158–85 mm. Georgetown market. (C. M. Cat. No. 2424*a–f*; I. U. Cat. No. 12552.)

Family XXIII. CICHLIDÆ.

Key to the Guiana Genera of Cichlidæ.

a. First dorsal and anal rays not especially prolonged.

b. Gill-rakers numerous, more than fifty on the lower arch, setiform; mouth moderate; anal spines three, alternating..... **Chætobranchus.**

bb. Gill-rakers not setiform.

c. Preopercle entire.
d. Gill-rakers minute; scales of the lateral line of the same size as those above or below it.
e. Upper gill-arch without a downward projecting lobe.
f. Mouth large, freely protractile; end of maxillary exposed.....**Acaropsis.**
ff. Mouth small, not greatly protractile; end of maxillary concealed.
g. Lateral line running close to the dorsal; head densely scaled.....**Nannacara.**
gg. Lateral line well separated from the dorsal.
h. Anal spines three; soft fins naked, or with scales at the bases only.
Æquidens.
hh. Anal spines more than three.
i. Ventrals inserted behind the origin of the dorsal.....**Cichlasoma.**
ii. Ventrals inserted in front of the origin of the dorsal.....**Mesonauta.**
cc. Upper gill-arch with a downward projecting lobe.
j. Lateral line well separated from the dorsal for most of its length.
k. Gill-rakers at the base of the lobe; mouth small, not greatly protractile; caudal emarginate.....**Acarichthys.**
kk. Gill-rakers running at the edge of the lobe of the first gill-arch; mouth small; premaxillary not greatly protractile.
l. Preorbital little if any wider than the eye; eye a little nearer to gill-opening than to snout; lateral line not continued on the caudal...**Biotodoma.**
ll. Preorbital twice as wide as the eye in the adult. Eye three times as far from the snout as from the gill-opening; lateral line forked at the caudal peduncle. Lower lip with a frenum.....**Geophagus.**
jj. Lateral line running within a scale, or a scale and a half, from the dorsal.
Heterogramma.
dd. Gill-rakers large, stiff; perciform, mouth large; scales of the lateral line larger than the rest.
Cichla.
cc. Preopercle finely serrate.
m. Jaws equal; mouth small; scales 26–29, those of the lateral line of the same size as those above or below it.....**Crenicara.**
mm. Lower jaw projecting; scales of the lateral line larger than those above or below it.
n. None of the teeth depressible; scales 55–70.....**Batrachops.**
nn. Inner teeth depressible; scales 38–130.....**Crenicichla.**
aa. First dorsal and anal rays prolonged; body much compressed, deep; gill-rakers moderate...**Pterophyllum.**

Chætobranchus Heckel.

Chætobranchus Heckel, Ann. Wiener Mus., II, 1840, 401 (*flavescens, brunneus*).—Günther, Catalogue, IV, 1862, 309 (*flavescens*).

Type, *Chætobranchus flavescens* Heckel.

This genus is readily distinguished from all other Guiana Cichlids by the numerous, long, setiform gill-rakers.

327. **Chætobranchus flavescens** (Heckel).

Chætobranchus flavescens Heckel, Ann. Wiener Mus., II, 1840, 402 (Guaporé; Rio Negro).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 625

(Amucu).—Günther, Catalogue, IV, 1862, 310 (Rio Negro; Guaporé).—Steindachner, "Chromiden Amazonenstromes," 1875, 68 (Cudajas; Santarem; Villa Bella; Coary; Teffé; Gurupa; Rio Xingu; Hyutay; Rio Negro; Guaporé; Hyavary; Lake Hyanuary).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 70 (name only).—Pellegrin, Bull. Mus. d'Hist. Nat., VIII, 1902, 182 (Marajo; Santarem; Manaos; Teffé; Tonantins); "Cichlidés," 164, in Mém. Soc. Zool. France, XVI, 1903, 200 (Santarem; Tonantins; Manaos).—von Ihering, Rev. Mus. Paulista, VII, 1907, 295.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 469.

Chætobranchus brunneus Heckel, Ann. Wiener Mus., II, 1840, 405 (Rio Negro).—Günther, Catalogue, IV, 1862, 310 (Rio Negro).

Chætobranchus robustus Günther, Catalogue, IV, 1862, 310 (British Guiana).

Chromys ucayalensis Castelnau, Anim. Am. Sud, Poiss., 1855, 15, pl. 6, fig. 2. (adult female).

Geophagus badiipinnis Cope, Proc. Acad. Nat. Sci. Phila., 1872, 251, pl. 11, fig. 1, juv. (Ambyiacu).

Two specimens, 102–224 mm. Rupununi. (C. M. Cat. No. 2298*a*; I. U. Cat. No. 12464.)

One specimen, 120 mm. Rockstone. (C. M. Cat. No. 2299.)

One specimen, 238 mm. Lama Stop-Off. (C. M. Cat. No. 2300.)

Two specimens, 212–217 mm. Maduni Creek. (C. M. Cat. No. 2301; I. U. Cat. No. 12465.)

Six specimens, 102–104 mm. Twoca Pan. (C. M. Cat. No. 2302*a–c*; I. U. Cat. No. 12466.)

Very similar to *Acaropsis;* distinguished by its gill-rakers. Head 2.66; depth 2.12–2.33; D. XIII,13 or 14; A. III,11 or 12; lateral line 16–18 + 10 or 11, scales 25–26 along a median series; eye 3.25–4 in the head, 1–1.5 in the interorbital; width of preorbital two-thirds to four-fifths of the diameter of the eye.

Compressed and elongate; snout pointed; mouth large, the maxillary exposed behind, not reaching to the vertical from the anterior margin of the eye; maxillary-premaxillary border 2.5 in the head; lips broad on the sides, the lower without a frenum; caudal peduncle two-thirds as long as high. Gill-rakers 60–70 in the lower arch, about eight-tenths as long as the eye.

Four to six rows of scales on the cheeks; scales of the sides regular, none notably decreased in size, feebly denticulate; one and one-half scales between the end of the lateral line and the dorsal; dorsal and anal entirely naked, caudal scaled to near its tip.

Dorsal spines low, becoming higher toward the last, which is a little less than half the length of the head; caudal rounded, soft dorsal and anal sometimes prolonged to the end of the caudal; pectoral as long as or longer than the head, reaching the soft part of the anal; ventrals sometimes reaching the rayed part of the anal.

A dark streak from the symphysis to the lower border of the preopercle, another one from the edge of the preorbital parallel with the one below it, both faint or absent in the young; a black spot on the middle of the sides, sometimes an obscure stripe from the upper angle of the gill-opening to the end of the soft dorsal; sometimes each scale of the sides with a light base and dark central spot; vertical fins with oblique or transverse hyaline bars.

Acaropsis Steindachner.

Acaropsis Steindachner, "Chromiden Amazonenstromes," 1875, 80.

Type, *Acara nassa* Heckel.

With the characters of *Æquidens*, but the mouth large, the premaxillaries very protractile; end of maxillary exposed, not slipping under the premaxillary.

328. Acaropsis nassa (Heckel).

Acara nassa Heckel, Ann. Wiener Mus., II, 1840, 353 (Rio Guaporé).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 624 (Lake Tapacuma).—Günther, Catalogue, IV, 1862, 281 (River Cupai).—Vaillant, Nouv. Arch. Mus. d'Hist. Nat., (4), II, 1900, 125 (Carsevenne).

Acara (*Acaropsis*) *nassa* Steindachner, "Chromiden Amazonenstromes," 1875, 81, pl. 2 (Gurupa; Montalegre; Tonantins; Villa Bella; Santarem; Teffé; Coary; Serpa; Obidos; Curupira; Ueranduba; Tapajos; Rio Negro; Xingu; Hyutay; Madeira; Guaporé; Lakes Alexo, Maximo, José Assu, Saraca; Manacapurú).—Pellegrin, Bull. Mus. d'Hist. Nat., VIII, 1902, 182 (Santarem; Manaos; Teffé; Tonantins).

Acaropsis nassa Eigenmann and Bray, Ann. N. Y. Acad. Sci., VII, 1894, 613.—Pellegrin, "Cichlidés," 144, in Mém. Soc. Zool. France, XVI, 1903, 180 (Orinoco; French Guiana; Manaos; Tonantins).—Regan, Ann. and Mag. Nat. Hist., (7), XV, 1905, 345 (Rio Cupai; Demerara; Teffé; Tonantins).—von Ihering, Rev. Mus. Paulista, VII, 1907, 307.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 470.

Acara cognatus Heckel, Ann. Wiener Mus., II, 1840, 356 (Barra do Rio Negro).

Acara unicolor Heckel, Ann. Wiener Mus., II, 1840, 357 (Barra do Rio Negro).
Acaropsis rostratus Schomburgk, Fishes Brit. Guiana, II, 1843, 163, pl. 15 (Rio Negro).

One specimen, 68 mm. Twoca Pan. (C. M. Cat. No. 2283.)

One specimen, 80 mm. Rupununi. (C. M. Cat. No. 2297.)

One specimen, 79 mm. Cane Grove Corner. (C. M. Cat. No. 2284.)

One specimen, 72 mm. Gluck Island. (C. M. Cat. No. 2285.)

Six specimens, 39–63 mm. Wismar. (C. M. Cat. No. 2286*a–c*; I. U. Cat. No. 12459.)

Thirteen specimens, 46–188 mm. Maduni Creek. (C. M. Cat. No. 2287*a–d*; I. U. Cat. No. 12458.)

Six specimens, 65–94 mm. Rockstone. (C. M. Cat. No. 2288*a–c;* I. U. Cat. No. 12457.)

Thirty-eight specimens, 60–202 mm. Lama Stop-Off. (C. M. Cat. No. 2289*a–h*; I. U. Cat. No. 12456*a–e*.)

Head 2.4–2.75; depth 1.9–2.2; D. XII–XIV,9–11; A. III,7–9; scales 22–24 along the middle line, half a scale between the lateral line and the soft dorsal. Lateral line 14–16 + 6–10; eye 3–3.5 in head, .8–1.2 in interorbital.

Snout pointed; mouth oblique, lower jaw projecting, maxillary reaching to below the eye; premaxillary-maxillary border 2 in the head; an outer row of conical teeth, a compact band of villiform teeth within it; preorbital 3 to 4 in the diameter of the eye. Eleven short gill-rakers on the lower arch.

Two or three rows of scales on the cheek; dorsal and anal entirely naked, no dorsal sheath.

Pectorals extending to above the middle of the anal; caudal rounded; dorsal spines graduated, soft dorsal and anal prolonged to near the end of the caudal; ventral filament rarely reaching caudal peduncle, one-half to three-fifths as long as deep.

Scales of lower part of sides with silvery spots; a dark band down and back from the eye to the angle of the preopercle, becoming divided with age into two spots, of which the lower is ocellated; a dark band from the eye to the end of the soft dorsal, intensified into a spot in the middle, but only the spot evident in the old; a small spot above the origin of the lateral line, another at the base of the upper caudal rays; vertical fins with light or dark spots; in the old the soft dorsal and anal become dark, there being conspicuous hyaline spots on the last few membranes; caudal rays dusky, the membranes alternately black and hyaline. Old individuals sometimes irregularly blotched with black.

Head 2.75; depth 2.33; D. XVI,7; A. III,7; scales 23 along a median series; lateral line 15 or 16 + 16 to 18; upper lateral line scarcely interrupted; eye 3.33 in the head, 1 in the interorbital; snout but little shorter than the eye.

Maxillary extending to below anterior margin of the eye; one-fourth of the eye in the posterior half of the head; about five gill-rakers. Teeth in two or three series, those of the outer row much the larger. Second scale of the lateral line separated by five scales from the dorsal, the fifth to the tenth by one and one-half scales, the last scale of the upper lateral line by half a scale.

A dark band from below the middle of the eye to the angle of the preopercle. Sides with about six cross-shades, the middle one with a distinct spot below the lateral line. A small round black spot above the last scale of the lateral line.

ÆQUIDENS[82] Eigenmann and Bray.

Acara, part, HECKEL, Ann. Wiener Mus., II, 1840, 338.

Æquidens EIGENMANN and BRAY, Ann. N. Y. Acad. Sci., VII, 1894, 616.

Type, *Acara tetramerus* Heckel.

Gills with minute rakers and no lobe; mouth small, not greatly protractile. Anal with three spines; lateral line well separated from the dorsal; soft fins naked, or with scales at their bases only; preopercle entire; scales of the lateral line of the same size as those above and below it.

KEY TO THE GUIANA SPECIES OF ÆQUIDENS.

a. Oval or subrhomboidal, the ventral profile equally arched with the dorsal; lateral line not forked on the caudal; caudal pedunele shorter than deep; caudal rounded.

b. Dorsal and anal densely scaled at the base; preopercle scaled. Caudal peduncle one-fourth to one-third as long as deep; an ocellated spot above the posterior part of the lateral line....**maronii.**

bb. Dorsal and anal naked, except sometimes a scale at the base of the membranes. Preopercle naked.

c. A dark band from the eye to the base of the hinder dorsal rays; a black spot below the middle of the upper lateral line and another at the base of the upper caudal rays; soft dorsal and anal in the adult sometimes with a single scale on the membranes; caudal pedunele two-thirds or three-fourths as long as deep.....**vittatus.**

cc. A black band from the eye to the spot at the base of the upper caudal rays.

d. A dark band from the eye down to the preopercle.....**potaroënsis.**

dd. A dark spot below and behind the eye.....**tetramerus.**

aa. Dorsal profile much more greatly arched than the ventral; lateral line forked on the caudal; caudal pedunele as long as deep; dorsal and anal naked; caudal emarginate; eye entirely in the posterior half of the head in the adult; preorbital very deep. A black bar from the nape through the eye to the angle of the preopercle; a dark band from the eighth dorsal spine to in front of the anus.....**geayi.**

[82] The reasons for using *Æquidens* are given at length in *Reports Princeton Univ. Exp. Patagonia*, III, 1910, 470.

Nannacara Regan.

Nannacara Regan, Ann. and Mag. Nat. Hist., (7), XV, 1905, 344.

Type, *Nannacara anomala* Regan.

This genus differs from *Æquidens* in having the lateral line running close to the dorsal fin. The species are minute.

329. **Nannacara anomala** Regan. (Plate LXV, fig. 9.)

Acara punctulata Günther, Ann. and Mag. Nat. Hist., (3), XII, 1863, 441, part (Guiana).

Nannacara anomala Regan, Ann. and Mag. Nat. Hist., (7), XV, 1905, 344 (Essequibo).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 470.

Two specimens, 30–32 mm. Aruka River. (C. M. Cat. No. 2303*a*; I. U. Cat. No. 12467.)

Fifteen specimens, 21–35 mm. Lama Stop-Off. (C. M. Cat. No. 2305*a–e*; I. U. Cat. No. 12468.)

Four specimens, 30–37 mm. Maduni Creek. (C. M. Cat. No. 2323; I. U. Cat. No. 12480.)

Head about 3; depth 2.66; D. XV or XVI,7 or 8; A. III,7 or 8; scales 21–25 in a median series, 15 or 16 + 6 or 7, the upper lateral line frequently interrupted; eye 3 in the head, .8 in the interorbital.

Elongate, rounded in front; mouth terminal, maxillary extending to below the eye, which is entirely in the front half of the head; maxillary-premaxillary border 3.5 in the head; preopercle, subopercle, interopercle, and opercle, as well as the cheek, with large scales; preorbital about one-third of the eye in width; teeth in several series, the outer ones enlarged.

Scales large, feebly ctenoid, two series on the cheek; upper lateral line separated from the anterior part of the dorsal by one scale or rarely by one and one-half scales, by half a scale farther back; dorsal, anal, and all but a small band at the base of the caudal, naked.

A dark stripe down and back from the eye; a dark median band from the eye to the caudal; sides clouded; tips of dorsal spines light.

330. **Nannacara bimaculata** sp. nov. (Plate LXVI, fig. 1.)

Type unique, 50 mm. Erukin. (Carnegie Museum Catalog of Fishes No. 2304.)

Similar to *N. anomala*, but readily distinguishable by its lateral and caudal spots.

331. Æquidens maronii Steindachner.

Acara maronii Steindachner, "Flussfische Südamerika's," ii, 1881, 41, pl. 2, fig. 4 (Maroni River, Guiana).—Pellegrin, "Cichlidés," 143, in Mém. Soc. Zool. France, XVI, 1903, 179 (Maroni; Ouanary).—Regan, Ann. and Mag. Nat. Hist., (7), XV, 1905, 344 (Surinam; Demerara).

Æquidens maronii Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 472.

Five specimens, 53–84 mm. Mud-flats below Wismar. (C. M. Cat. No. 2382*a–c*; I. U. Cat. No. 12522.)

One specimen, 60 mm. Barima River. (C. M. Cat. No. 2384*a*.)

Twelve specimens, the smallest 91 mm. Kumaka. (C. M. Cat. No. 2385*a–d*; I. U. Cat. No. 2523.)

Head 3; depth 1.66–1.75; D. XV,10; A. III,9–11; lateral line 15 + 7; scales 22–24; eye 3.25 in the head, .7 in the preorbital, 1.3 in the eye in the larger; eye in the center of the head, measuring to the upper angle of the gill-opening.

Short and deep, oval, the dorsal profile not much more arched than the ventral; the caudal peduncle very short, one-fourth to one-third as long as deep; maxillary not quite reaching the eye; premaxillary-maxillary border 4 in the head. Lower lip with a frenum. Cheeks with three series of scales; preopercle with a single series of scales; three scales between the lateral line and the dorsal; basal parts of dorsal and anal densely scaled; lateral line not forked on the caudal.

Dorsal spines subequal from the third, the last one-half or less than one-half the length of the head; caudal rounded; pectoral about as long as the head.

A black band from in front of the dorsal through the eye and through the angle of the preopercle; a large ocellated spot between the lateral line and the posterior dorsal spines. Sides with dark streaks between the rows of scales. Fins unspotted.

332. Æquidens vittatus (Heckel).

Acara vittata Heckel, Ann. Wiener Mus., II, 1840, 346 (Cujabá).—Steindachner, "Chromiden Amazonenstromes," 1875, 12, pl. 3, fig. 1 (Cujabá; Paraguay).—Boulenger, Boll. Mus. Zool. ed Anat. Comp. Torino, XV, 1900, — (Caranda-siñho).—Vaillant, Nouv. Arch. Mus. d'Hist. Nat., (4), II, 1900, 125 (Carnot; Lunito).—Pellegrin, Bull. Mus. d'Hist. Nat., VIII, 1902, 182, part (Tonantins); "Cichlidés," 137, in Mém. Soc. Zool. France, XVI, 1903, 173 (Guiana; Colombia; Tonantins).—Regan, Ann. and Mag. Nat. Hist., (7), XV, 1905, 333.—von Ihering, Rev. Mus. Paulista, VII, 1907, 310 (Rio Cabriales, Valencia, Venezuela).

Æquidens vittata Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 472.

Four specimens, 58–120 mm. Wismar. (C. M. Cat. No. 2386*a–b*; I. U. Cat. No. 12524.)

Nine specimens, 70–160 mm. Malali. (C. M. Cat. No. 2387*a–e*; I. U. Cat. No. 12525.)

Fifty-one specimens, 33–88 mm. Lama Stop-Off. (C. M. Cat. No. 2388*a–e*; I. U. Cat. No. 12526.)

Ten specimens, 30–78 mm. Madumi Creek. (C. M. Cat. No. 2389*a–e*; I. U. Cat. No. 12527.)

Head 2.75–2.8; depth 2.2–2.33; D. XIII or XIV, 10 or 11; A. III, 7 or 8; lateral line 16 + 10 + $\frac{0-1}{0-1}$; scales 24–26; eye 3.4 in the head, 1 in the preorbital, 1.66 in the interorbital in the largest; eye midway between upper angle of the gill-opening and the anterior nares in the largest, in the middle of the head in the smaller specimen.

Elongate; dorsal and ventral profiles nearly equally arched; maxillary not reaching the eye in the oldest; maxillary-premaxillary border 3 in the head. Lower lip with a frenum. Five gill-rakers on the lower arch. Cheeks with four series of scales; preopercle naked; one to one and one-half scales between the lateral line and the dorsal; basal parts of the dorsal and anal naked, except in the old, when there may be a scale on each membrane; lateral line usually not forked on the caudal.

Dorsal spines subequal from the fourth, the last spine half the length of the head; caudal rounded, the outer rays sometimes projecting; dorsal and anal sometimes prolonged to the end of the caudal. Pectoral about as long as the head.

Sides with about six faint cross-bars; a band from the eye to the base of the last dorsal ray, intensified into a spot over the second cross-band; a spot at the base of the upper caudal ray; a dark streak forward and another downward from the eye.

333. **Æquidens potaroënsis** sp. nov. (Plate LXVI, fig. 2.)

Type, 140 mm. Amatuk. (Carnegie Museum Catalog of Fishes No. 2407.)

Cotype, 140 mm. Potaro Landing. (C. M. Cat. No. 2390*a*.)

Cotypes, two specimens, 123–133 mm. Ireng River near Holmia. (C. M. Cat. No. 2391*a*; I. U. Cat. No. 12528.)

Cotype, one specimen, 122 mm. Kangaruma. (C. M. Cat. No. 2392*a*.)

Cotypes, thirty-three specimens, 38–132 mm. Holmia. (C. M. Cat. No. 2393*a–e*; I. U. Cat. No. 12529.)

Cotypes, sixteen specimens, 80–170 mm. Amatuk. (C. M. Cat. No. 2394*a–d*; I. U. Cat. No. 12530.)

Cotypes, twenty-five specimens, 34–115 mm. Tukeit. (C. M. Cat. No. 2395*a–e*; I. U. Cat. No. 12531.)

Cotypes, twenty-seven specimens, 20–130 mm. Savannah Landing. (C. M. Cat. No. 2396*a–e*; I. U. Cat. No. 12532.)

Cotypes, three specimens, 51–118 mm. Creek between Kangaruma and Potaro Landing. (C. M. Cat. No. 2397*a–b*; I. U. Cat. No. 12535.)

Cotype, one specimen, 85 mm. Crab Falls. (C. M. Cat. No. 2398*a*.)

Cotype, one specimen, 44 mm. Two hours below Holmia. (C. M. Cat. No. 2399*a*.)

Cotypes, five specimens, 25–65 mm. Aruataima. (C. M. Cat. No. 2400*a–c*; I. U. Cat. No. 12533.)

Cotypes, three specimens, 45–67 mm. Erukin. (C. M. Cat. No. 2408*a–b*; I. U. Cat. No. 12534.)

Cotype, one specimen, 60 mm. Konawaruk. (C. M. Cat. No. 2401*a*.)

Cotype, one specimen, 28 mm. Waratuk. (C. M. Cat. No. 2402*a*.)

Evidently very closely related to *Æ. tetramerus*, from which it can easily be distinguished by the dark band from the eye through the angle of the preopercle.

Head 3; depth 2.28; D. XIV,10; A. III,8; lateral line 16 + 8 to 11 + $\frac{0}{0-1}$; scales 24 to 26 along a median series; eye 3.66 in the head, 1 in the preorbital, 1.66 in the interorbital, in the largest; eye a little behind the middle in the largest.

Lateral line rarely forked on the caudal; last dorsal spine less than half the length of the head.

Sides with six cross-bands; a dark band from the eye to the spot at the base of the upper caudal rays, intensified where it crosses the vertical bands, the spot below the middle of the lateral line largest; a spot at the base of the upper caudal lobe; a dark band from the eye to a little in front of the angle of the preopercle; last parts of dorsal and upper half of caudal with hyaline spots.

334. Æquidens tetramerus (Heckel).

Acara tetramerus Heckel, Ann. Wiener Mus., II, 1840, 341 (Rio Branco).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 624 (Lakes Tapacuma, Capoye, and Amucu).—Günther, Catalogue, IV, 1862, 277 (Guiana; Rio Branco).—Cope, Proc. Acad. Nat. Sci. Phila., 1872, 255 (Ambyiacu).—Steindachner, "Chromiden Amazonenstromes," 1875, 5 (Tabatinga; Teffé; Obidos; Villa Bella; Cudajas; Santarem; Gurupa; Pará; Rio Hyutay; Tajapurú;

Rio Negro; Rio Branco; Porto do Moz; Rio Puty; Rio Guaporé, near Mattogrosso; Lakes José Assu, Hyanuary, Alexo, Saraca, and Maximo); "Flussfische Südamerika's," iv, 1882, 2 (Rio Huallaga; Rio Amazonas; Iquitos).—Boulenger, Boll. Mus. Zool. ed Anat. Comp. Torino, XV, 1900, — (Carandasiñho).—Pellegrin, Bull. Mus. d'Hist. Nat., VIII, 1902, 182 (Marajo; Santarem; Manaos; Teffé; Tabatinga); "Cichlidés," 135, in Mém. Soc. Zool. France, XVI, 1903, 171 (British Guiana; Carsevenne, Ucayale; Tabatinga; Cudajas; Tocantins; Pará; Rio de Janeiro; Bahia).—Regan, Ann. and Mag. Nat. Hist., (7), XV, 1905, 332 (Essequibo; Cudajas).—von Ihering, Rev. Mus. Paulista, VII, 1907, 309 (Rio Jurua).

Astronotus tetramerus Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 68 (name only).

Astronotus (Æquidens) tetramerus Eigenmann and Bray, Ann. N. Y. Acad. Sci., VII, 1894, 617.

Æquidens tetramerus Eigenmann and Kennedy, Proc. Acad. Nat. Sci. Phila., 1903, 534 (Rio Branco; Matto Grosso; Campo Grande; Estancia la Armonia; Arroyo Trementina; Arroyo Carumbey; Tolducue; Salamanca).—Eigenmann, Ann. Carnegie Mus., IV, 1907, 144 (Asuncion; Corumbá; Bahia Negra; Puerto Max; Villa Rica).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 471.

Acara viridis Heckel, Ann. Wiener Mus., II, 1840, 344 (Marabitanos, on the Rio Negro).

Acara pallidus Heckel, Ann. Wiener Mus., II, 1840, 347 (Rio Negro).

Acara dimerus Heckel, Ann. Wiener Mus., II, 1840, 351 (Cujabá).

Pomotis bono Schomburgk, Fishes Brit. Guiana, II, 1843, 171 (all rivers).

Chromys punctata Castelnau, Anim. Am. Sud, Poiss., 1855, 13, pl. 8, fig. 1.

Chromys uniocellata Castelnau, Anim. Am. Sud, Poiss., 1855, 15, pl. 6, fig. 1 (Ucayale, Peru).

Acara uniocellata Günther, Catalogue, IV, 1862, 281 (copied).

One specimen, 198 mm. Rupununi. (C. M. Cat. No. 2403*a*.)

Four specimens, 70–103 mm. Gluck Island. (C. M. Cat. No. 2404*a–b*; I. U. Cat. No. 12338.)

Three specimens, 168–180 mm. Lama Stop-Off. (C. M. Cat. No. 2405*a–b*; I. U. Cat. No. 12536.)

Four specimens, 65–78 mm. Rockstone. (C. M. Cat. No. 2406*a–b*; I. U. Cat. No. 12537.)

Head 2.75–3; depth 2–2.33; D. XIII–XV 9–11; A. III,8–10; lateral line 17 +

10; scales 25–27 along a middle line; eye 4 in the head, 1 in the preorbital, 2 in the interorbital in the largest. Eye a little behind the middle of the head in the largest.

Oval, the dorsal and ventral profiles equally arched; caudal peduncle three-fourths as long as deep; maxillary not reaching the eye, maxillary-premaxillary border 3 in the head. Lower lip with a frenum; five or six gill-rakers on the lower arch. Cheeks with three or four series of scales; preopercle naked; one and one-half to two and one-half scales between the lateral line and the dorsal; basal parts of the dorsal and anal naked; lateral line not forked on the caudal.

Dorsal spines subequal from the fourth, the last spine one-half or less than one-half the length of the head; caudal rounded; dorsal and anal sometimes prolonged; pectoral as long as or longer than the head.

A dark spot below and behind the eye; a dark band from the eye to the ocellated spot at the base of the upper caudal rays; sides with about six cross-bands, the one under the twelfth dorsal spine intensified into a spot below the lateral line; vertical fins spotted or barred. The general color-markings of the body become obscure with age, those of the fins more intense.

335. Æquidens geayi (Pellegrin).

Acara geayi Pellegrin, Bull. Mus. d'Hist. Nat., VIII, 1902, 417; "Cichlidés," 142, in Mém. Soc. Zool. France, XVI, 1903, 178, pl. 4, fig. 3 (River Camopi, French Guiana).—Regan, Ann. and Mag. Nat. Hist., (7), XV, 1905, 339 (Essequibo; Cayenne).

Æquidens geayi Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 472.

One specimen, 108 mm. Crab Falls. (C. M. Cat. No. 2373*a*.)

One specimen, 63 mm. Rockstone. (C. M. Cat. No. 2374*a*.)

Eight specimens, 72–120 mm. Amatuk. (C. M. Cat. No. 2375*a–b*; I. U. Cat. No. 12518.)

One specimen, 106 mm. Erukin. (C. M. Cat. No. 2376*a*.)

Two specimens, 51–103 mm. Creek below Potaro Landing. (C. M. Cat. No. 2377*a*; I. U. Cat. No. 12519.)

One specimen, 98 mm. Konawaruk. (C. M. Cat. No. 2378*a*.)

Three specimens, 60–130 mm. Tumatumari. (C. M. Cat. No. 2379*a–b*; I. U. Cat. No. 12520.)

One specimen, 75 mm. Gluck Island. (C. M. Cat. No. 2380*a*.)

One specimen, 97 mm. Packeoo Falls. (C. M. Cat. No. 2381*a*.)

Eight specimens, 71–113 mm. Maripieru. (C. M. Cat. No. 2382*a–b*; I. U. Cat. No. 12521.)

Head 3–3.25; depth 2–2.33; D. XV,10 or 11; A.III,8; lateral line 17–19 + 9–12 + $\frac{1-6}{1-8}$; scales 27; eye 3.5 in the head, 1.5 in the preorbital, 1.33 in the interorbital in the larger; 3, .8, .8, respectively in the small; eye in posterior half of the head, measured to the upper angle of the gill-opening.

Dorsal profile steep, becoming more so with age, ventral profile scarcely arched; maxillary not reaching to below the eye, maxillary-premaxillary border 3.25 in the head in the larger. Lower lip with a frenum. Depth of caudal peduncle equal to its length.

Cheeks with four or five series of scales; preopercle naked; one to one and one-half scales between the end of the lateral line and the dorsal; seven gill-rakers on the lower arch; dorsal and caudal naked; lateral line forked on the caudal. Dorsal spines subequal from the fourth or fifth, the last one-half to three-fifths the length of the head; dorsal and anal prolonged, sometimes reaching the end of the caudal. Caudal emarginate, the outer rays sometimes a little prolonged; pectoral as long as the head or a little shorter.

A curved bar from the nape through the eye and through the angle of the preopercle; another bar curved backward from below the middle of the spinous dorsal towards a point in front of the anus. Ends of soft dorsal and anal and middle of caudal with hyaline spots.

Cichlasoma Swainson.

Cichlasoma Swainson, Class. Fishes, Amph., and Rept., 1839, 230 (*bimaculatum*).

Acara, part, Heckel, Ann. Wiener Mus., II, 1840, 338.

Heros Heckel, Ann. Wiener Mus., II, 1840, 362 (restricted by Jordan and Evermann to *severum*).

Hoplarchus Kaup, Archiv für Naturg., XXVI, 1860, 128 (*pentacanthus*).

Theraps Günther, Catalogue, IV, 1862, 284 (*irregularis*).

Archocentrus Gill, Proc. Acad. Nat. Sci. Phila., 1877, 186 (*centrarchus*).

Astatheros Pellegrin, "Cichlidés," 167, in Mém. Soc. Zool. France, XVI, 1903, 203 (*heterodontus*).

Erythrichthus Meek, Field Mus. Zool. Series, VII, 1907, 121.

Parapetenia Regan, Ann. and Mag. Nat. Hist., (7), XVI, 1905, 324 (*adspersa*).

Type, *Sciæna bimaculata* Linnæus.

Gills normal, gill-rakers short; lateral line well separated from the dorsals; preopercle entire; mouth small, premaxillary not greatly protractile; anal with more than three spines.

336. **Cichlasoma bimaculatum** (Linnæus).

"Acara" Piso, Hist. Natural Medic., 1658, 67.

"Labrus," No. 87, Gronow, Mus. Ichth., 1754, 36 (Surinam).

"Sparus," No. 227, Gronow, Zoophyl., 1763, 64, pl. 5, fig. 4.

Sciæna bimaculata Linnæus, Mus. Adolphi Fred., I, 1754, 66.

Labrus bimaculatus Linnæus, Syst. Nat., ed. 10, I, 1758, 285; ed. 12, I, 1766, 477 (Mediterranean).

Perca bimaculata Bloch, Ausl. Fische, VI, 1799, 82, pl. 310 (Brazil).

Cichla bimaculata Bloch and Schneider, Syst. Ichth., 1801, 338.

Heros bimaculatus Cope, Proc. Acad. Nat. Sci. Phila., 1872, 254 (Ambyiacu).

Acara bimaculata Günther, Catalogue, IV, 1862, 276 (Guiana; Guaporé; Trinidad; Demerara).—Pellegrin, Bull. Mus. d'Hist. Nat., V, 1899, 158 (Apuré).

Acara (*Heros*) *bimaculata* Steindachner, SB. Akad. Wiss. Wien, LXXI, 1875, 82 (Pará; Gurupa; Santarem; Obidos; Cudajas; Villa Bella; Tabatinga; Serpa; Curupira; Rio Hyutay; Porto do Moz; Ceara; Rio Guaporé; Cujabá; Pebas; ? Bahia; ? Rio de Janeiro).

Astronotus (*Cichlasoma*) *bimaculatus* Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 68.—Eigenmann and Bray, Ann. N. Y. Acad. Sci., VII, 1894, 618 (Brazil).

Heros (*Cichlasoma*) *bimaculata* Pellegrin, Bull. Mus. d'Hist. Nat., VIII, 1902, 182 (Marajo; Santarem; Manaos; Teffé).

Cichlasoma bimaculatum Pellegrin, "Cichlidés," 168, in Mém. Soc. Zool. France, XVI, 1903, 204 (Brit. Guiana; Surinam; Cayenne; Ouanary; Tonantins).—Regan, Ann. and Mag. Nat. Hist., (7), XVI, 1905, 68 (Demerara; Trinidad; Bahia; Tabatinga).—von Ihering, Rev. Mus. Paulista, VII, 1907, 331.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 473.

Labrus punctatus (part) Linnæus, Syst. Nat., ed. 10, I, 1758, 285 (Surinam).

Labrus punctatus Bloch, Ausl. Fische, VI, 1799, 20, pl. 295 (Surinam).—Bloch and Schneider, Syst. Ichth., 1801, 251.

Acara punctata Heckel, Ann. Wiener Mus., II, 1840, 361 (Surinam).

Chromis tænia Bennett, Proc. Zool. Soc. London, I, 1830, 112 (Trinidad).—Storer, Mem. Am. Acad. Arts and Sciences, II, 1846, 520.

Cychlasoma tænia Gill, Ann. Lyc. Nat. Hist. N. Y., VI, 1858, 383 (Trinidad).

Acara margarita Heckel, Ann. Wiener Mus., II, 1840, 338 (Guaporé).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 624 (Amucu and swamps).

Acara marginata Heckel, Ann. Wiener Mus., II, 1840, 350 (Cujabá).

Acara gronovii Heckel, Ann. Wiener Mus., II, 1840, 361 (Surinam), based on "Labrus," No. 87 of Gronow.

Centrarchus cyanopterus Schomburgk, Fishes Brit. Guiana, II, 1843, 165 (Essequibo).

Eight specimens, 84–148 mm. Pacopoo Pan. (C. M. Cat. No. 2290*a–c*; I. U. Cat. No. 12460*a–c*.)

One specimen, 145 mm. Lama Stop-Off. (C. M. Cat. No. 2409.)

Eleven specimens, 84–200 mm. Botanic Garden. (C. M. Cat. No. 2291*a–c*; I. U. Cat. No. 12461.)

Five specimens, 80–103 mm. Twoca Pan. (C. M. Cat. No. 2292*a–c*; I. U. Cat. No. 12462.)

Sixty-five specimens, 22–148 mm. Georgetown trenches. (C. M. Cat. No. 2293*a–j*; I. U. Cat. No. 12463.)

Two specimens, 67–76 mm. Chipoo Creek. (C. M. Cat. No. 2354*a*; I. U. Cat. No. 12501.)

Head 2.8–3; depth 2; D. usually XV,11, rarely XVI,10; A. IV,8 or 9. Scales 24 to 25 in a median series. Eye 4 in the head, 2 in the interorbital (2.5 + 1 in young), in advance of the middle of the head.

Oval, heavy forward, the interorbital broad, the snout blunt; mouth small, maxillary not extending to below origin of eye; premaxillary-maxillary border about 3.5 in the head; outer teeth large, conical, increasing in size forward; inner teeth much smaller, in narrow bands; preorbital .6–.8 in the eye; about seven gill-rakers on the lower arch, all of them small, the anterior minute; caudal peduncle about two-fifths as long as deep.

Three or four rows of scales on the cheek; scales regular, those of the lateral line similar to those above and below it; bases of the membranes of the dorsal and anal with three or four scales, one and one-half scales between end of lateral line and dorsal.

Pectorals about reaching to above origin of the anal; dorsal spines increasing rapidly to the fifth spine, then more gradually to the last, which is nearly half the length of the head; caudal rounded. Soft dorsal and anal sometimes prolonged to the end of the caudal; first ventral ray prolonged into a filament reaching beyond origin of anal.

Becoming dark with age; a large spot on the base of the upper caudal rays, vermiculations below it; a black spot near the middle, a dark line extending forward from it to the gill-opening or to the eye; about eight obscure cross-bands; each scale of the lower part of the sides of the anterior half of the body with a silvery spot, those of the posterior half with a dark spot; a dark spot below posterior part of eye. End of soft dorsal, caudal, and end of anal with hyaline spots or bands. Sometimes irregularly blotched with black.

337. **Cichlasoma severum** (Heckel).

Heros severus Heckel, Ann. Wiener Mus., II, 1840, 362 (Rio Negro, near Marabitanos).

Astronotus (*Cichlasoma*) *severus* Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 68.—Eigenmann and Bray, Ann. N. Y. Acad. Sci., VII, 1894, 619 (Brazil).

Cichlasoma severum Regan, Ann. and Mag. Nat. Hist., (7), XVI, 1905, 322 (Rio Cupai; Guiana; Teffé).—von Ihering, Rev. Mus. Paulista, VII, 1907, 330.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 475.

Heros coryphœus Heckel, Ann. Wiener Mus., II, 1840, 364 (Rio Guaporé).

Heros modestus Heckel, Ann. Wiener Mus., II, 1840, 366 (Rio Guaporé).

Heros spurius Heckel, Ann. Wiener Mus., II, 1840, 368 (Rio Guaporé).—Günther, Catalogue, IV, 1862, 293 (Guiana; Brazil).

Acara (*Heros*) *spuria* Steindachner, "Süsswasserfische d. Südöstlichen Brasilien," i, in SB. Akad. Wiss. Wien, LXX, 1874, 507, pl. 4; ii, LXXI, 1875, 83; "Chromiden Amazonenstromes," 1875, 23 (Tabatinga; Tonantins; Coary; Teffé; Obidos; Cudajas; Santarem; Gurupa; Xingu, near Porto do Moz; Rio Tapajos; Madeira; Guaporé; Rio Negro; Rio Içа or Putumayo; Rio Hyutay; Ambyiacu; Lakes Alexo, Hyanuary, José Assu, Saraca (near Silva), and Maximo).

Heros spurius Pellegrin, "Cichlidés," 200, in Mém. Soc. Zool. France, XVI, 1903, 236 (Ucayale; Teffé; Manaos; Tonantins; Tabatinga).

Heros fasciatus Heckel, Ann. Wiener Mus., II, 1840, 372 (Rio Negro).—Günther, Catalogue, IV, 1862, 294.

Centrarchus notatus Schomburgk, Fishes Brit. Guiana, II, 1842, 160.

Chromys appendiculata Castelnau, Anim. Am. Sud, Poiss., 1855, 15, pl. 7, fig. 3.

Chromys fasciata Castelnau, Anim. Am. Sud, Poiss., 1855, 17, pl. 9, fig. 2 (juv.).

Uarn centrarchoides Cope, Proc. Acad. Nat. Sci. Phila., 1872, 253, pl. 11, fig. 2 (juv.) (Ambyiacu).

One specimen, 62 mm. Lower Potaro. (I. U. Cat. No. 12463.)

One specimen, 108 mm. Twoca Pan. (C. M. Cat. No. 2294.)

Head 3; depth 1.7–1.8; D. XVI,13 or 14; A. VII,14; scales 30 in a median series, 19 + 12 + $\frac{3 \text{ or } 4}{5}$; eye 3.3 in the head, 1 in the preorbital, 1.4 in the interorbital; 3, .6, and 1 respectively, in the smaller specimens.

Compressed, pumpkin-seed shaped; caudal peduncle not half as long as deep; mouth small, maxillary not nearly reaching eye; premaxillary-maxillary border 4 in the head; outer series of teeth conical, increasing in size forward, few smaller inner teeth; lower lip without a frenum; about nine rakers on the lower arch.

About five rows of scales on the cheek; scales above the lateral line much smaller than those below it, about seven scales between the end of the lateral line and the dorsal; bases of soft dorsal and anal scaled.

Pectoral about as long as the head, reaching to above the anterior anal spines, ventral filaments reaching beyond origin of anal.

A series of seven bands on the sides, the one from end of dorsal to end of anal (the sixth) heaviest and continued on bases of dorsal and anal. A dark band down from the eye; soft dorsal, end of anal, and caudal in the larger specimens spotted with black.

MESONAUTA Günther.

Mesonauta GÜNTHER, Catalogue, IV, 1862, 300.

Type, *Heros insignis* Heckel = *Heros festivus* Heckel.

Compressed, increasing in width to the posterior half of the dorsal; scales of the lateral line of the same size as those above or below it; lower lip with a frenum; origin of dorsal behind that of the ventral.

338. **Mesonauta festivus** (Heckel).

Heros festivus HECKEL, Ann. Wiener Mus., II, 1840, 376 (Guaporé).

Acara (*Heros*) *festiva* STEINDACHNER, "Chromiden Amazonenstromes," in SB. Akad. Wiss. Wien, LXXXI, 1875, 93 (Tabatinga; Tonantins; Teffé; Obidos; Villa Bella; Serpa; Gurupa; Tajapurú; Jatuarana; Maues; Guaporé; Tapajoz; Içа; Hyutay; Xingu at Porto do Moz; Araguay; Lakes Hyanuary, Alexo, Manacapurú, Saraca, José Assu; Lago Maximo).

Mesonauta festivus EIGENMANN and BRAY, Ann. N. Y. Acad. Sci., VII, 1894, 619.—EIGENMANN and KENNEDY, Proc. Acad. Nat. Sci. Phila., 1903, 535 (Arroyo Trementina).—EIGENMANN, Ann. Carnegie Mus., IV, 1907, 145 (Corumbá).

Cichlasoma festivum REGAN, Ann. and Mag. Nat. Hist., (7), XVI, 1905, 69 (Demerara; Rio Negro; Descalvados; Carandasiñho; Tocantins).—VON IHERING, Rev. Mus. Paulista, VII, 1907, 332.—EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 473.

Heros insignis HECKEL, Ann. Wiener Mus., II, 1840, 379 (Marabitanos, on the Rio Negro).

Mesonauta insignis GÜNTHER, Catalogue, IV, 1862, 300 (Tropical America).—BOULENGER, Boll. Mus. Zool. ed Anat. Comp. Torino, XV, 1900, —(Carandasiñho).—PELLEGRIN, Bull. Mus. d'Hist. Nat., VIII, 1902, 182 (Manaos; Teffé; Tonantins; Tabatinga).

Cichlasoma insigne Pellegrin, "Cichlidés," 185, in Mém. Soc. Zool. France, XVI, 1903, 221 (Orinoco; Teffé; Manaos).

Chromys acara Castelnau, Anim. Am. Sud, Poiss., 1855, 17, pl. 9, fig. 1.

One specimen, 52 mm. Cane Grove Corner. (C. M. Cat. No. 2358*a*.)

Twelve specimens, 55–135 mm. Botanic Garden. (C. M. Cat. No. 2359*a–f*; I. U. Cat. No. 12505.)

Twenty-four specimens, 39–68 mm. Malali. (C. M. Cat. No. 2360*a–c*; I. U. Cat. No. 12506.)

Thirty-seven specimens, 27–147 mm. Lama Stop-Off. (C. M. Cat. No. 2361*a–c*; I. U. Cat. No. 12507.)

Three specimens, 30–35 mm. Gluck Island. (C. M. Cat. No. 2489*a–c*.)

Twelve specimens, 14–137 mm. Christianburg Canal. (C. M. Cat. No. 2362*a–f*; I. U. Cat. No. 12508.)

Three specimens, 31–50 mm. Rockstone. (C. M. Cat. No. 2363*a–b*; I. U. Cat. No. 12509.)

Ten specimens, 26–83 mm. Maduni Creek. (C. M. Cat. No. 2364*a–b*; I. U. Cat. No. 12510.)

One specimen, 62 mm. Paekeoo Falls. (C. M. Cat. No. 2365*a*.)

Seven specimens, 19–82 mm. Konawaruk. (C. M. Cat. No. 2369*a–d*; I. U. Cat. No. 12511.)

One specimen, 65 mm. Crab Falls. (C. M. Cat. No. 2368*a*.)

Six specimens, 50–95 mm. Twoca Pan. (C. M. Cat. No. 2366*a–c*; I. U. Cat. No. 12512.)

Eight specimens, 47–102 mm. Rupununi. (C. M. Cat. No. 2367*a–d*; I. U. Cat. No. 12513.)

Head 2.6–3; depth 2–2.75; D. XIV–XVI,10–12; A. VIII or IX,10 or 12; lateral line 17 + 10 or 11 $\frac{0-4}{0-3}$; scales 27–29 along the middle line. Eye 3 in the head, .8 in the preorbital, 1.7 in the interorbital in the largest.

Increasing in depth to the anal; deep behind, the length of the caudal peduncle about 3 in its depth; pointed in front, the head abruptly contracted in front of the breast; head broad above; snout rounded, anterior part of head bluntly conical; mouth terminal, maxillary reaching about half-way to the eye; maxillary-premaxillary border 3.75 in the head; five or six gill-rakers on the lower arch; lower lip with a frenum.

Cheeks with three or four series of scales; end of lateral line about four scales removed from the dorsal; bases of soft dorsal, anal, and caudal scaled.

Pectorals much shorter than the head; ventrals with long streamers, sometimes

reaching the end of the caudal; caudal broad, rounded; dorsal and anal lobes extending beyond the caudal.

A conspicuous band from the snout to the end of the first dorsal rays; a prominent ocellus at the base of the upper caudal rays; vertical fins spotted; traces of cross-bands, which are prominent in the very young.

Acarichthys gen. nov.

Type, *Acara heckelii* Müller and Troschel.

Allied to *Retroculus,* but the dorsal lobe of the first gill-arch very feebly developed, the rakers about two, along its base. Mouth small, the premaxillary not greatly protractile. Caudal emarginate, scaled at its base only; eye in posterior half of the head.

This genus bridges the gap between *Æquidens* on the one side and *Geophagus* on the other. It approaches *Æquidens geayi* very closely in shape.

339. **Acarichthys heckeli** (Müller and Troschel).

Acara heckelii Müller and Troschel, in Schomburgk, Reisen, III, 1848, 624 (swamps and savannas).—Günther, Catalogue, IV, 1862, 279.

Geophagus thayeri Steindachner, "Chromiden Amazonenstromes," in SB. Akad. Wiss. Wien, LXXXI, 1875, 48, pl. 3, fig. 2 (Teffé; Villa Bella; Obidos; Cudajas; Tonantins; Jatuarana; Ueranduba; Serpa; Rio Tapajos; Rio Trombetas; Rio Negro; Xingu; Lakes Hyanuary, José Assu, Saraca, Alexo, and Maximo).—Pellegrin, "Cichlidés," in Mém. Soc. Zool. France, XVI, 1903, 189 (Obidos; Manaos; Tonantins).

Geophagus (*Mesops*) *thayeri* Pellegrin, Bull. Mus. d'Hist. Nat., VIII, 1902, 182 (Santarem; Manaos; Teffé; Tonantins; Tabatinga).

Acara subocularis Cope, Proc. Am. Philos. Soc., XVII, 1878, 696 (Peruvian Amazon).

Although the description of *heckelii* is very brief it is quite evident that it is *Geophagus*-like; the lateral spot should make it either *surinamensis* or *thayeri,* while the fin formula given by Müller and Troschel leaves no doubt that they had the present species.

Three specimens, 95–155 mm. Rupununi. (C. M. Cat. No. 2370*a–b*; I. U. Cat. No. 12514.)

Two specimens, 95–100 mm. Rockstone sand-bank. (C. M. Cat. No. 2371*a*; I. U. Cat. No. 12515.)

Four specimens, 75–115 mm. Gluck Island. (C. M. Cat. No. 2373*a–b*; I. U. Cat. No. 12516.)

Head 3+ ; depth 2.25–3; D. XII–XIV,11 or 12; A. III,7 or 8; lateral line 18–19 + 13–16; scales 29–30 in a median series; eye 3.5 in the head, 1.3 in the preorbital, 1 in the interorbital in the largest; eye in posterior half of the head in the young.

Dorsal profile steep, the back arched; ventral profile but slightly arched; maxillary-premaxillary border 3.5 in the head; maxillary reaching a little beyond the posterior nares, which are half-way between the tip of the snout and the eye. Lower lip with a frenum; depth of caudal peduncle 1.25 in its length. Gill-rakers 11, the upper two at the base of the lobe.

Cheeks with about six series of scales; preopercle naked; one scale between the lateral line and the dorsal. Base of caudal scaled, fins otherwise naked.

Dorsal spines subequal from the third, the last a little more than half the length of the head; dorsal sometimes prolonged beyond the caudal; caudal emarginate, its outer rays prolonged; pectoral longer than the head.

A narrow dark bar from the nape through the eye to the angle of the preopercle; a black spot near the middle of the sides; a black spot on the anterior dorsal spines; dorsal, caudal, and anal with hyaline spots.

Biotodoma Eigenmann and Kennedy.

Mesops Günther, Catalogue, IV, 1862, 311 (*cupido*), preoccupied.

Biotodoma Eigenmann and Kennedy, Proc. Acad. Nat. Sci. Phila., 1903, 533.

Type, *Geophagus cupido* Heckel.

Upper gill-arch with a downward projecting lobe, carrying the gill-rakers at its margin; upper lateral line well separated from the dorsal; lateral line not forked on the caudal; preorbital about equal to the eye in the adult.

340. Biotodoma cupido (Heckel).

Geophagus cupido Heckel, Ann. Wiener Mus., II, 1840, 399 (Rio Negro; Rio Guaporé).—Cope, Proc. Am. Philos. Soc., XVII, 1878, 697 (Peruvian Amazon).—Pellegrin, "Cichlidés," 153, in Mém. Soc. Zool. France, XVI, 1903, 189 (Obidos; Manaos; Tonantins).—Regan, Ann. and Mag. Nat. Hist., (7), XVII, 1906, 54 (Essequibo; Tonantins).—von Ihering, Rev. Mus. Paulista, VII, 1907, 317.

Mesops cupido Günther, Catalogue, IV, 1862, 311 (Rio Negro; Guaporé).

Geophagus (Mesops) cupido Steindachner, "Chromiden Amazonenstromes," 1875, 47 (Amazon, near Teffé; Coary; Cudajas; Lake Hyanuary; Rio Negro; Guaporé; Içá; Hyutay; Sambaia; Jatuarana).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 70 (name only).—Pellegrin, Bull. Mus.

d'Hist. Nat., VII, 1902, 182 (Marajo; Santarem; Manaos; Teffé; Tonantins; Tabatinga).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 479.

Acara subocularis Cope, Proc. Am. Philos. Soc., XVII, 1878, 696 (Peruvian Amazon).

Thirteen specimens, 42–72 mm. Rockstone. (C. M. Cat. No. 2346*a–c*; I. U. Cat. No. 12497.)

Six specimens, 64–130 mm. Gluck Island. (C. M. Cat. No. 2347*a–c*; I. U. Cat. No. 12498.)

One specimen, 87 mm. Malali. (C. M. Cat. No. 2348*a*.)

One specimen, 61 mm. Tumatumari. (C. M. Cat. No. 2349*a*.)

One specimen, 105 mm. Crab Falls. (C. M. Cat. No. 2350*a*.)

Thirteen specimens, 55–100 mm. Konawaruk. (C. M. Cat. No. 2351*a–c*; I. U. Cat. No. 12499.)

Seven specimens, 55–103 mm. Lama Stop-Off. (C. M. Cat. No. 2352*a–d*; I. U. Cat. No. 12500.)

Head 3.33; depth 2.2–2.4; D. XV,10 or 11; A. III,8 or 9, rarely 10; lateral line 17–19 + 15 or 16; scales 29–31 along a median series; eye 2.66–3 in the head, 1 in the interorbital; preorbital less than the diameter of the eye, except in the old.

Deep forward, profile rapidly descending to the tip of the snout, less rapidly to the caudal peduncle, which is 1.4 times as long as deep; mouth small, maxillary not extending to below the eye; maxillary-premaxillary border 4 in the head. Seven small rakers on the lower gill-arch; distance of eye from the gill-opening less than 2 in its distance from the snout.

Scales of breast very small, two and one-half scales between the end of the lateral line and the dorsal; dorsal and anal naked; caudal lobes scaled for more than half their length, but without lateral line organs.

Dorsal spines subequal from the sixth, the last equal to half the length of the head; caudal emarginate, especially in the young; pectoral longer than the head, extending to above the anal spines; ventral filaments extending beyond the origin of the anal.

An ocellated black spot on the lateral line below the end of the spinous dorsal; a curved black stripe from the nape through the eye beyond the angle of the preopercle, most intense below the eye; sides with broad, obscure cross-bars; fins plain.

Geophagus Heckel.

Geophagus Heckel, Ann. Wiener Mus., II, 1840, 383 (*altifrons*).

Type, *Geophagus altifrons* Heckel = *Sparus surinamensis* Bloch.

Upper gill-arch with a downward projecting lobe, carrying the gill-rakers at its margin; upper lateral line well separated from the dorsal. Lateral line forked at the caudal; preorbital in adult about twice as wide as the eye.

KEY TO THE GUIANA SPECIES OF GEOPHAGUS.

a. Dorsal and anal scaled at the base in the adult. Caudal densely scaled to near its tip; a large black spot on the middle of the sides..... surinamensis.

aa. Dorsal and anal naked in the adult; usually a small black spot at the base of the upper caudal rays. jurupari.

341. **Geophagus surinamensis** (Bloch). (Plate LXVI, fig. 3.)

Sparus surinamensis BLOCH, Ausl. Fische, 1791, pl. 277, fig. 2 (Surinam).

Geophagus surinamensis MÜLLER and TROSCHEL, in Schomburgk, Reisen, III, 1848, 625 (Lakes Tapacuma, Capoye, and Amucu; swamps of the savannas).—GÜNTHER, Catalogue, IV, 1862, 315 (River Capin; Guiana).—STEINDACHNER, "Chromiden Amazonenstromes," in SB. Akad. Wiss. Wien, LXXXI, 1875, 63 (Pará; Gurupa; Villa Bella; Obidos; Tabatinga; Montalegre; Teffé; Coary; Fonteboa; Santarem; Tonantins; Alexo; José Assu; Hyanuary; Maximo; Rio Negro; Iça; Xingu; Trombetas; Madeira; Guaporé; Tocantins, near Cameta; Hyutay; Tapajos).—EIGENMANN and EIGENMANN, Proc. U. S. Nat. Mus., XIV, 1891, 71 (name).—PELLEGRIN, Bull. Mus. d'Hist. Nat., VIII, 1902, 182 (Marajo; Pará; Santarem; Manaos; Tonantins; Tabatinga); "Cichlidés," in Mém. Soc. Zool. France, XVI, 1903, 198 (Surinam; Brit. Guiana; Cayenne; Cameta; Manaos; Marajo; Tonantins; Ucayale).—REGAN, Ann. and Mag. Nat. Hist., (7), XVII, 1906, 55 (Surinam; Guiana; Rio Capin; Obidos; Cameta; Manaos; Teffé).—VON IHERING, Rev. Mus. Paulista, VII, 1907, 317 (Teffé).—EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 478.

Three specimens, 47, 172, and 180 mm. Crab Falls. (C. M. Cat. No. 2324*a–b*; I. U. Cat. No. 12491.)

Two specimens, 170–180 mm. Malali. (C. M. Cat. No. 2325*a*; I. U. Cat. No. 12492.)

Five specimens, 52–94 mm. Mud-flats below Wismar. (C. M. Cat. No. 2326*a–b*.)

Five specimens, 70–112 mm. Wismar. (C. M. Cat. No. 2327*a–e*; I. U. Cat. No. 12493.)

Two specimens, 34–37 mm. Tumatumari. (C. M. Cat. No. 2328*a*; I. U. Cat. No. 12494.)

Five specimens, 110–120 mm. Bartica. (C. M. Cat. No. 2329*a–b*; I. U. Cat. No. 12495.)

Six specimens, 210–245 mm. Rockstone sand-bank. (C. M. Cat. No. 2330*a–b*; I. U. Cat. No. 12496.)

Two specimens, 27–33 mm. Crab Falls. (C. M. Cat. No. 2459; I. U. Cat. No. 12564.)

Head 3–3.4; depth 2.25–2.5; D. XVII (rarely XVIII), 11 or 12; A. III,7 or 8; lateral line 22 or 23 + 17 or 18 + $\frac{22-31}{15-31}$; about thirty-five scales in a median line; eye 2.25 in the snout, 4 in the head, 1.3 in the interorbital in the old, 1.75, 3, 1+, respectively, in a specimen 112 mm. long.

Rather elevated forward, the profile steep, the depth of the caudal peduncle 1.5 in its length; maxillary not reaching to the eye; maxillary-premaxillary border 3.3 in the head; distance of eye from the gill-opening 3 in its distance from the snout. Gill-rakers about 10.

Scales of the breast very small; base of the dorsal and anal scaled in the old, the anal naked in a specimen 180 mm. long, both dorsal and anal naked in the smaller young; caudal scaled to near its tip; one or two scales between the lateral line and the dorsal; caudal leathery in the old. Dorsal spines subequal from the fifth or sixth, or graduated to the last, which may be more than half the head in height. Caudal emarginate; ventral filament sometimes reaching to the end of the base of anal.

A large spot below the lateral line near the middle of the length; throat bluish black. Living specimens from Rockstone had the breast pink, lower fins dark red with light blue stripes; sides with blue lines and deep orange spots, becoming yellow below; caudal and dorsal dark red.

One of the specimens taken on the sand-bank at Rockstone carried young in its mouth.

342. **Geophagus jurupari** Heckel. (Plate LXVII, figs. 1–3.)

Geophagus jurupari Heckel, Ann. Wiener Mus., II, 1840, 392 (Barra do Rio Negro).—Cope, Proc. Acad. Nat. Sci. Phila., 1872, 251 (Ambyiacu).—Steindachner, "Chromiden Amazonenstromes," in SB. Akad. Wiss. Wien, LXXXI, 1875, 60 (Tabatinga; Tonantins; Fonteboa; Serpa; Teffé; Gurupa; Pará; Rio Trombetas; Rio Negro, at Manaos; Rio Xingu, at Porto do Moz; Rio Hyutay; Hyavary; Ambyiacu); "Flussfische Südamerika's," iv, 1882, 2.—Pellegrin, Bull. Mus. d'Hist. Nat., V, 1899, 405 (Manaos); VIII, 1902, 182 (Marajo; Santarem; Manaos; Teffé; Tonantins; Tabatinga); "Cichlidés," in Mém. Soc. Zool. France, XVI, 1903, 189 (Teffé; Manaos).—Regan, Ann. and Mag. Nat. Hist., (7), XVII, 1906, 56 (Guiana; Lago do Maximo; Coary; Teffé).—von Ihering, Rev. Mus. Paulista, VII, 1907, 319.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 479.

Satanoperca jurupari Günther, Catalogue, IV, 1862, 313 (copied).

Geophagus (Satanoperca) jurupari Steindachner, "Flussfische Südamerika's," iv, 2 (Huallaga; Iquitos).—Eigenmann and Eigenmann, Proc. U. S. Nat. Mus., XIV, 1891, 71 (name only).

Geophagus pappaterra Müller and Troschel (not of Heckel), in Schomburgk, Reisen, III, 1848, 625 (Amucu).

Geophagus leucostictus Müller and Troschel, in Schomburgk, Reisen, III, 1848, 625 (Lake Amucu; swamps of the savannas).

Satanoperca leucosticta Günther, Catalogue, IV, 1862, 314 (copied).

Satanoperca macrolepis Günther, Catalogue, IV, 1862, 314 (Demerara; British Guiana).

I have examined the type of *G. leucostictus* and the specimen of *G. pappaterra* mentioned by Müller and Troschel, also:

Eight specimens, 78–200 mm. Rupununi. (C. M. Cat. No. 2331*a–d*; I. U. Cat. No. 12481.)

One specimen, 140 mm. Twoca Pan. (C. M. Cat. No. 2332.)

One specimen, 180 mm. Crab Falls. (C. M. Cat. No. 2333.)

One specimen, 102 mm. Botanic Garden. (C. M. Cat. No. 2334.)

One specimen, 111 mm. Packeoo Fall. (C. M. Cat. No. 2335.)

Eighteen specimens, 38–240 mm. Maduni Creek. (C. M. Cat. No. 2336*a–e*; I. U. Cat. No. 12482.)

Fifteen specimens, 40–202 mm. Lama Stop-Off. (C. M. Cat. No. 2337*a–e*; I. U. Cat. No. 12483.)

Forty-four specimens, 46–185 mm. Wismar. (C. M. Cat. No. 2338*a–e*; I. U. Cat. No. 12484.)

Four specimens, 60–117 mm. Mud-flats below Wismar. (C. M. Cat. No. 2339*a–b*; I. U. Cat. No. 12485.)

Four specimens, 97–201 mm. Malali. (C. M. Cat. No. 2340*a–b*; I. U. Cat. No. 12486.)

Three specimens, 60–85 mm. Gluck Island. (C. M. Cat. No. 2341*a–b*; I. U. Cat. No. 12487.)

One specimen, 90 mm. Warraputa. (C. M. Cat. No. 2342*a*.)

Two specimens, 45–50 mm. Cane Grove Corner. (C. M. Cat. No. 2343*a*; I. U. Cat. No. 12488.)

Six specimens, 55–84 mm. Rockstone. (C. M. Cat. No. 2344*a–c*; I. U. Cat. No. 12489.)

Seven specimens, 18–65 mm. Konawaruk. (C. M. Cat. No. 2345*a–d*; I. U. Cat. No. 12490.)

Head 2.66–2.75; depth 2.25–2.6; D. XV,10 or 11; A. III,7; lateral line 17 + 13 + $\frac{8}{15}$ to 19 + 14 + $\frac{7}{14}$; scales 29–31 in a series along the middle of the sides; eye 2.5 in the snout, 4.3 in the head, 1.4 in the interorbital in the largest; 2.3, 4, .8 respectively in a specimen 165 mm. long; eye 1.75 in the preorbital in the largest specimen, 1.4 in the smaller.

Elongate, not especially deep in front, the caudal peduncle about as deep as long; distance from eye to gill-opening 3 in its distance from the snout in the 165 mm. specimen; about fourteen to sixteen gill-rakers on the lower arch; mouth horizontal, low, maxillary not reaching to below the eye, maxillary-premaxillary border not quite 3 in the length of the head; lower lip with a frenum.

Scales of the breast small, but much larger than in *cupido;* one to two scales between the end of the lateral line and the dorsal; dorsal and anal entirely naked; caudal lobes scaled for about half their length.

Dorsal spines subequal from the fourth or fifth, the last equal to half the length of the head; dorsal and anal filaments frequently extending beyond the caudal, the ventral filaments sometimes beyond the base of the anal; caudal truncate or very feebly lunate; pectorals a little shorter than the head.

Five obscure cross-shades in the young; two dark, parallel streaks from the eye to the upper lip; a small, round, black spot at the base of the upper caudal ray; sides of head with blue spots, which increase in size with age; scales of the sides of the young with a bright blue dot, becoming diffuse with age; soft dorsal, caudal, and latter part of anal with hyaline spots; dorsal sometimes with a black border and a submarginal hyaline band.

One of the specimens taken at Lama Stop-Off was carrying young in her mouth.

Heterogramma Regan.

Heterogramma Regan, Ann. and Mag. Nat. Hist., (7), XVII, 1906, 60.

Type, *Mesops tæniatus* Günther.

First branchial arch with a lobe on the upper portion, with feeble rakers at the margin of the lobe; upper lateral line running close to the dorsal.

D. XV–XVI,5–7.

343. **Heterogramma ortmanni** sp. nov. (Plate LXVIII, fig. 1.)

Type, 64 mm. Erukin. (Carnegie Museum Catalog of Fishes No. 2306.)

Cotype, one specimen, 30 mm. Packeoo Fall. (C. M. Cat. No. 2308.)

Cotype, one specimen, 76 mm. Kangaruma. (C. M. Cat. No. 2309.)

Cotypes, three specimens, 31–62 mm. Gluck Island. (C. M. Cat. No. 2310*a–b*; I. U. Cat. No. 12469.)

Cotypes, eleven specimens, 22–37 mm. Konawaruk. (C. M. Cat. No. 2311*a–f*; I. U. Cat. No. 12470.)

Cotype, one specimen, 32 mm. Savannah Landing. (C. M. Cat. No. 2353.)

Cotypes, forty-five specimens, 22–66 mm. Erukin. (C. M. Cat. No. 2307*a–z*; I. U. Cat. No. 12471.)

One specimen, 31 mm. Rockstone. (C. M. Cat. No. 2458.)

Head 2.66–3; depth 2.8–3.25; D. XV (rarely XVII), 7; A. III,6, rarely 7; scales 22–24 in a median series, lateral line 12–14 + 6 or 7; eye 1.2 in the snout, 3.33 in the head, .8 in the interorbital in the largest; 1, 3.25, .75 in the smallest.

Elongate; snout pointed, mouth terminal; dorsal and ventral profile of the head equally diverging from the median axis; maxillary not reaching to below the eye; maxillary-premaxillary border equal to the snout, 3 in the head; teeth in narrow bands, those of the outer series but little larger than the rest; width of preorbital four-tenths of the diameter of the eye. Four rakers on the lobe of the gills, about seven on the lower arch; caudal peduncle little deeper than long.

Scales of the head inconspicuous, about three series on the cheek, none on the preopercle and interopercle; scales of the lateral line of the same size as those above and below it; the fifth scale of the lateral line one and one-half scales from the dorsal, the seventh one scale, the last half a scale from the dorsal. Dorsal and anal entirely naked, a few scales at the base of the caudal.

Pectoral shorter than the head; last dorsal spine a little more than half, and middle spines about half, the length of the head; caudal rounded; dorsal and anal prolonged into filaments, the former reaching past middle of caudal; ventral filaments reaching soft part of anal.

Sides with about six cross-bands; a dark band from snout to middle of caudal, two to four narrow lines parallel with it on the lower part of the sides; one or two of the lines below the lower margin of the pectoral; a dark band from below the eyes down and back to the union of suboperele and interopercle; a black spot across base of caudal; another back from eye across the nape; first two dorsal spines bluish black; remainder of the spinous dorsal uniform dusky; last dorsal and anal rays cross-barred; caudal in adult with seven dark cross-bands, disappearing toward the margin, the bands less numerous in smaller specimens; a black spot above the base of the upper pectoral ray; ventral spine and a spot at its base bluish black.

This species differs from *H. corumbæ*, which it approaches in color, in the much more pointed snout and the position of the dark lines below the dark lateral band; in *corumbæ* these are all above the lower margin of the pectoral.

344. **Heterogramma steindachneri** Regan. (Plate LXVIII, fig. 2.)

Heterogramma steindachneri Regan, Ann. and Mag. Nat. Hist., (8), I, 1908, 371 (Georgetown).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 478.

One specimen, 65 mm. Twoca Pan. (C. M. Cat. No. 2312.)

Two specimens, 51 mm. Chipoo Creek. (C. M. Cat. No. 2313; I. U. Cat. No. 12472.)

Two specimens, 55–70 mm. Mud-flats, Demerara River. (C. M. Cat. No. 2314; I. U. Cat. No. 12473.)

Four specimens, 35–52 mm. Below Packeoo Falls. (C. M. Cat. No. 2315*a–b*; I. U. Cat. No. 12474.)

Twenty-five specimens, 25–50 mm. Gluck Island. (C. M. Cat. No. 2316*a–e*; I. U. Cat. No. 12475.)

Fourteen specimens, 24–40 mm. Rockstone. (C. M. Cat. No. 2317*a–h*; I. U. Cat. No. 12476.)

Two specimens, 45–65 mm. Christianburg. (C. M. Cat. No. 2318; I. U. Cat. No. 12477.)

Eleven specimens, 35–50 mm. Maduni Creek. (C. M. Cat. No. 2319; I. U. Cat. No. 12478.)

One specimen, 28 mm. Cane Grove Corner. (C. M. Cat. No. 2320.)

Forty-one specimens, 22–57 mm. Lama Stop-Off. (C. M. Cat. No. 2321*a–e*; I. U. Cat. No. 12479.)

One specimen, 28 mm. Kumaka. (C. M. Cat. No. 2457.)

One specimen, 30 mm. Tumatumari. (C. M. Cat. No. 2322.)

I am not absolutely certain about the identification of this species. It is widely distributed, reaching from tidal influence to the headwaters of the Rupununi and the Ireng River of the Amazon basin. It frequently differs from the typical *steindachneri* of Regan and from all other species of the genus in having the middle caudal rays truncate, and the outer rays prolonged.

Head 2.8–3; depth 2.4–2.6; D. XV,7 or 8; A. III,6; lateral line 13 or 14 + 5 or 6; scales 21–23 in a median line; eye 1 in the snout, 3.5 in the head, 1 in the interorbital.

Rather deep, the dorsal profile steeper than the ventral, the mouth terminal. Maxillary reaching to below the anterior margin of the eye, maxillary-premaxillary line about 3 in the length of the head; width of preorbital little more than one-third of the diameter of the eye.

One-half to one and one-half scales above the lateral line for most of its

length. Last dorsal spine equal to half the length of the head or a little longer. Caudal rounded, or truncate in the middle, the outer rays prolonged.

A large spot at the base of the caudal, another smaller one on the middle of the sides; a black band from the eye to the upper lip, another to the edge of the preopercular-subopercular suture, a third from the eye backward across the nape, and a fourth from the eye to the caudal peduncle; sides with cross-bands; first two or three dorsal membranes dusky, last dorsal and anal and middle caudal rays cross-barred.

Cichla Bloch and Schneider.

"Luckanani," "Lucanari" and "Sun-fish."

Cichla Bloch and Schneider, Syst. Ichth., 1801, 340.

Type, *Cichla ocellaris* Bloch and Schneider.

Perciform; lateral line continuous in the young, usually interrupted in the adult, forked at the base of the caudal. Soft dorsal, caudal, and anal scaled; gill-arch normal, the rakers long and heavy; spinous and soft dorsal of nearly equal extent, separated by a notch; anal spines three; each jaw with a band of broad villiform teeth.

It seems quite certain that there are three species of this genus in South America. Steindachner ("Flussfische Südamerika's," iv, pl. 1) figures *ocellaris* and *temensis* a little over 100 mm. long. Both of these species are certainly different from my specimens 116–137 mm. long, which are near enough Steindachner's specimens in size to form a conclusive judgment. My specimens between 116–137 mm. are certainly identical with the school of young I obtained one night at the Rockstone Stelling; my next larger ones differ distinctly in color, and approach the *ocellaris* of Bloch and Schneider.

It seems to me that the *flavo-maculata, trifasciata, nigro-maculata,* and *argus* of Schomburgk are based on series of different-sized individuals in the order named —the first being about 150 mm. long. I am in doubt about the identification of Müller and Troschel's *Acharnes speciosus.* It is about 125 mm. long, and is certainly different in color from my specimens of that size. It resembles very closely Steindachner's figure of *ocellaris* mentioned above.

I must leave in abeyance the question whether or not there are two species of *Cichla* in British Guiana and also the name by which they ought to be called.

345. **Cichla ocellaris** Bloch and Schneider. (Plate LXIX, figs. 1–4.)

? *Cichla ocellaris* Bloch and Schneider, Syst. Ichth., 1801, 340, pl. 66.—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 625 (all rivers).—Günther,

Catalogue, IV, 1862, 304 (Demerara).—Pellegrin, Bull. Mus. d'Hist. Nat., VIII, 1902, 182 (Pará; Manaos; Teffé; Tonantins); "Cichlidés," in Mém. Soc. Zool. France, XVI, 1903, 148 (Orinoco; Brit. Guiana; Cayenne; Maroni; Rio Yapura; Amazonas).—von Ihering, Rev. Mus. Paulista, VII, 1907, 292. —Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 469.

Cychla flavo-maculata Schomburgk, Fishes Brit. Guiana, II, 1843, 145, pl. 6 (Rio Negro and Padauiri).

Cychla nigro-maculata Schomburgk, Fishes Brit. Guiana, II, 1843, 151, pl. 9 (Rio Negro, Padauiri).

Acharnes speciosus Müller and Troschel, in Schomburgk, Reisen, III, 1848, 622; Horæ Ichth., III, 1849, 27, pl. 5, fig. 3 (mouth of Essequibo).—Günther, Catalogue, III, 1861, 369.

For a full list of references to the nominal species of *ocellaris* see Pellegrin.

The best food fish in Guiana.

One specimen, about 600 mm. Tumatumari. (C. M. Cat. No. 2276.)

One specimen (a head). Rockstone. (I. U. Cat. No. 12449.)

One specimen, 249 mm. Rockstone. (C. M. Cat. No. 2275.)

Two specimens, 225–237 mm. Tumatumari. (C. M. Cat. No. 2277; I. U. Cat. No. 22450.)

Two specimens, 170–192 mm. Twoca Pan. (C. M. Cat. No. 2278; I. U. Cat. No. 22451.)

Two specimens, 121–137 mm. Gluck Island. (C. M. Cat. No. 2279; I. U. Cat. No. 22452.)

Seven specimens, 215–300 mm. Lama Stop-Off. (C. M. Cat. No. 2280*a–b*; I. U. Cat. No. 22453.)

One hundred eighty-two specimens, 40–55 mm. Rockstone Stelling. (C. M. Cat. No. 2281*a–z*; I. U. Cat. No. 12454.)

One specimen, 116 mm. Warraputa. (C. M. Cat. No. 2282.)

Head 3; depth 3–3.5; D. XV,17; A. III,11 or 12; scales about 85 in a series below the lateral line; eye 3.5–5.5 in the head, .8–1.25 in the interorbital.

Compressed, perciform; head deep, the lower jaw projecting, maxillary extending to below anterior margin of the eye. Teeth in narrow bands; gill-rakers 5 + 16, strong, the largest 2 in the eye; dorsal mostly naked, a row of scales on the anterior rays; caudal scaled except a narrow margin; anterior part of anal scaled. About thirteen scales between the end of the upper lateral line and the dorsal. Dorsal deeply notched; caudal truncate, faintly notched in the young.

The color changes notably with age. In the smallest a dark streak from snout

to end of opercle, three large conspicuous black spots along the sides, one just behind the head, one below the soft dorsal, and one on the caudal peduncle and base of middle caudal rays. A dark shade between the spinous dorsal and the first spot. It is probable that the three-spotted stage is preceded by a stage with a black lateral band.

In the specimens 140 mm. long the sides have a few light spots, which in part ocellate the black spots, the hinder half of the last spot is conspicuously margined; three narrow cross-bars have developed, one through the first lateral spot, one between the first and second spots, and one through the anterior half of the second spot; the dorsals and the upper half of the caudal are clouded or spotted.

In specimens 175 mm. long the longitudinal band on the head and the lateral spots have vanished, the three cross-bars have become wider and more prominent, the soft dorsal and upper half of the caudal are spotted, and the end of the last lateral spot has changed into an ocellated spot above the center of the base of the caudal.

In larger ones the transverse bands concentrate into irregular black spots, which may or may not be ocellated with yellow; a constellation of black spots between the eye and the end of the opercle.

In life the lower fins, and abruptly the lower half of the caudal, are red.

It would appear from the specimens and figures that the young of the different species of this genus differ from each other more than the adults differ from each other, also that the Guiana species passes from the spotted stage into a banded stage and from the latter into another spotted stage.

The specimen of *Acharnes speciosus* in the Berlin Museum is certainly a *Cichla*. It is faded. The vertical dark bands still show, but the larger lateral spots, which should still be evident in specimens of *ocellaris* of this size (105 mm. to the base of the caudal), are not evident.

Crenicara Steindachner.

Crenicara Steindachner, SB. Akad. Wiss. Wien, LXXI, 1875, 99.

Type, *Crenicara elegans* Steindachner.

Body ovate; scales of the lateral line of the same size as those above or below it; mouth small; jaws equal; margin of preopercle serrate.

346. **Crenicara punctulata** (Günther).

Acara punctulata (part) Günther, Ann. and Mag. Nat. Hist., (3), XII, 1863, 441 (Essequibo).

Crenicara punctulata Pellegrin, "Cichlidés," in Mém. Soc. Zool. France, XVI,

1903, 169.—Regan, Proc. Zool. Soc. London, 1905, i, 152.—von Ihering, Rev. Mus. Paulista, VII, 1907, 296.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 477.

One specimen, 68 mm. Gluck Island. (C. M. Cat. No. 2295.)

Head 3.5; depth 2.5; D. XVI,9; A. III,8; scales 28 in a median series; lateral line 19 + 12; eye 2.8 in the head, .8 in the interorbital, .6 in the preorbital.

Compressed, blunt forward, drawn out behind, the caudal peduncle about as long as high; mouth terminal, small, the maxillary not reaching the eye, entirely concealed when the mouth is closed; the premaxillary-maxillary border 3.5 in the head; teeth in very narrow bands, the outer series enlarged; posterior edge of preopercle finely denticulate; about three rakers on the lower gill-arch.

Three or four rows of scales on the cheek; scales regular, a single scale between the end of the lateral line and the dorsal; dorsal and anal entirely free from scales; dorsal spines increasing rapidly to the fourth or fifth, subequal from there to the last, the middle spines a little the longest; pectoral longer than the head, both pectoral and ventrals about reaching the anal.

A spot behind the opercle continued as a band to the middle of the caudal, but more intense and with downward extensions at intervals, back with cross-shades; each scale of the side with a silvery spot; dorsals and middle caudal rays cross-barred; opercles dark; a black stripe from the lateral line across the preorbital.

Batrachops Heckel.

Batrachops Heckel, Ann. Wiener Mus., II, 1840, 432.

Boggiania Perugia, Ann. Mus. Genova, (2), XVIII, 1897, 148.

Type, *Batrachops reticulatus* Heckel.

Very similar to *Crenicichla*, from which it differs in its nondepressible inner teeth.

347. **Batrachops punctulatus** Regan.

Crenicichla reticulata (not of Heckel) Pellegrin, "Cichlidés," 342, in Mém. Soc. Zool. France, XVI, 1903, 378 (Essequibo).

Batrachops punctulatus Regan, Proc. Zool. Soc. London, 1905, i, 156, pl. 14, fig. 1. —von Ihering, Rev. Mus. Paulista, VII, 1907, 299.

Two specimens, 68–128 mm. Crab Falls. (C. M. Cat. No. 2255*a*; I. U. Cat. No. 12431.)

Head 3.25; depth 5; D. XXII,13; A. III,8; lateral line 25 + 11 to 15; scales in a series below the lateral line 65–76; four scales between the dorsal and the end of the lateral line; eye 4 in the head, 1.2 in the interorbital, 1.5 in the space between the eyes.

Nares near the lip, half-way between tip of snout and eye; maxillary extending beyond the origin of the eye; gill-rakers very short, nodular, about eight on the lower arch; scales ctenoid on sides and caudal peduncle, cycloid on head, ventral surface, and above anterior third of upper lateral line, the cycloid scales much smaller than those of the sides.

An ocellated spot at base of upper half of the caudal; sides with cross-shades; an obscure dark band from eye to an obscure spot above the pectoral; each of the ctenoid scales with a dark base; soft dorsal faintly spotted; the vertical fins otherwise plain dusky in the larger specimen, the entire dorsal spotted in the smaller.

Crenicichla Heckel.

Crenicichla Heckel, Ann. Wiener Mus., II, 1840, 416.

Type, *Crenicichla*?

Elongate; margin of preopercle denticulate, lower jaw projecting; inner teeth of the inner series depressible; scales of the lateral line larger than those above or below it.

Key to the Guiana Species of Crenicichla.

a. Scales rough.

b. Scales 50–62 in a series below the lateral line; an ocellus or plain spot at the base of the *upper* caudal lobe in all but the very young.

c. Maxillary extending to below the eye; a humeral spot in all but the very young, which greatly resemble *cc*.

d. Humeral spot entirely below the lateral line, frequently ocellated; sides frequently with silvery or blue spots; a band from the eye to the humeral spot ..... saxatilis.

dd. Center of humeral spot on the lateral line, except in the very young; a band from the chin or eye to the tip of the middle caudal rays, running below the humeral spot ..... alta.

cc. Maxillary not extending to the vertical from the anterior margin of the eye; no humeral spot. wallacei.

bb. Scales 106–113 in a series below the lateral line; a black spot at the base of the middle caudal rays; young with lines of black dots ..... lugubris.

aa. Scales smooth, imbedded; no caudal ocellus; scales 97–108 in a series below the lateral line ..... johanna.

348. Crenicichla saxatilis (Linnæus).

"Sciæna" Linnæus, Mus. Adolphi Fred., 1754, 65, pl. 31, fig. 1.

"Sparus," No. 185, Gronow, Mus. Ichth., II, 1756, 29, pl. 6, fig. 3 (Surinam).

Sparus saxatilis Linnæus, Syst. Nat., ed. 10, I, 1758, 278; ed. 12, I, 1766, 468 (Surinam).

Perca saxatilis Bloch, Ausl. Fische, VI, 1792, 79, pl. 309 (Surinam).

Crenicichla saxatilis Heckel, Ann. Wiener Mus., II, 1840, 432 (name only).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 626 (all rivers).—Günther, Catalogue, IV, 1862, 308 (Demerara; Dutch Guiana[83]).—Bou-

[83] I am not sure whether the other localities belong to this species.

LENGER, Proc. Zool. Soc. London, 1887, 275 (Canelos); Boll. Mus. Zool. ed Anat. Comp. Torino, X, 1895, — (Paraguay); Ann. and Mag. Nat. Hist., (6), XX, 1897, 295 (Soure); Boll. Mus. Zool. ed Anat. Comp. Torino, XII, 1897, — (San Lorenzo, Argentina).—PERUGIA, Ann. Mus. Genova, (2), X, 622 (Chaco Centrale; Candelaria).—EIGENMANN and EIGENMANN, Proc. U. S. Nat. Mus., XIV, 1891, 70.—EIGENMANN and BRAY, Ann. N. Y. Acad. Sci., VII, 1894, 620 (Amazon).—BERG, Com. Mus. Nac. Buenos Aires, I, 1899, 170.—VAILLANT, Nouv. Arch. Mus. d'Hist. Nat., (4), II, 1900, 125 (Carsevenne; Carnot; Lunier). —BOULENGER, Boll. Mus. Zool. ed Anat. Comp. Torino, XIV, 1899, — (Rio Zamora); XV, 1900,—(Carandasiñho).—PELLEGRIN, "Cichlidés," 337, in Mém. Soc. Zool. France, XVI, 1903, 373 (Cayenne, French Guiana).—REGAN, Proc. Zool. Soc. London, 1905, i, 159 (British Guiana; Demerara; Essequibo; Surinam; Berbice; Trinidad).—VON IHERING, Rev. Mus. Paulista, VII, 1907, 302 (Poço Grande; Rio Juquiá; Iguapé; Ypanema; Piquete; Rio Doce).—EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 477.

Cychla labrina (? Agassiz, et al.) SCHOMBURGK, Fishes Brit. Guiana, II, 1843, 139, pl. 3 (lower and upper parts of rivers).

Scarus pavonius GRONOW, Cat. Fish, ed. Gray, 1854, 63 (Surinam).

Crenicichla frenata GILL, Ann. Lyc. Nat. Hist. N. Y., VI, 1858, 386 (Trinidad).

Crenicichla saxatilis albopunctata PELLEGRIN, "Cichlidés," 338, in Mém. Soc. Zool France, XVI, 1903, 374 (French and British Guiana).

Crenicichla vaillanti PELLEGRIN, Bull. Mus. d'Hist. Nat., IX, 1903, 124; "Cichlidés," 304, in Mém. Soc. Zool. France, XVI, 1903, 340 (Mana; British Guiana).

I secured two forms of *Crenicichla* resembling *saxatilis*. One is found along the coast and inland to Rockstone, the other from Rockstone on upward. I never secured both forms together except on Gluck Island at Rockstone, at the boundary between the two areas. The coastal form is undoubtedly the *saxatilis* of Bloch (of which I examined the originals in Berlin) and also of authors generally.

The upper one may be one of the nominal Amazonian species. It will require a larger series of Amazonian specimens than there are on hand at present to determine whether the Amazonian forms are all *saxatilis*, or whether one of them is the species found in the upland of Guiana. I therefore give only that part of the synonymy and bibliography which undoubtedly refers to *saxatilis*, and provisionally describe the upland species as new.

Twenty-one specimens, 50–120 mm. Lama Stop-Off. (C. M. Cat. No. 2244*a–e*; I. U. Cat. No. 12421.)

Seven specimens, 133–230 mm. Georgetown. (C. M. Cat. No. 2245*a–c*; I. U. Cat. No. 12422.)

Three specimens, 112–235 mm. Botanic Garden. (C. M. Cat. No. 2246*a*; I. U. Cat. No. 12423.)

Two specimens, 103–195 mm. Barima. (C. M. Cat. No. 2247*a*; I. U. Cat. No. 12424.)

Ten specimens, 63–118 mm. Issorora. (C. M. Cat. No. 2248*a–b*; I. U. Cat. No. 12425.)

Four specimens, 78–135 mm. Koreabo. (C. M. Cat. No. 2249*a–b*; I. U. Cat. No. 12426.)

Six specimens, 68–168 mm. Aruka. (C. M. Cat. No. 2250*a–c*; I. U. Cat. No. 12433.)

Two specimens, 122–125 mm. Gluck Island. (C. M. Cat. No. 2267*a*; I. U. Cat. No. 12430.)

Twenty-six specimens, 45–135 mm. Lowlands of Guiana.

Three specimens, 57–152 mm. Wismar. (C. M. Cat. No. 2251*a–b*; I. U. Cat. No. 12427.)

Two specimens, 75–90 mm. Christianburg. (C. M. Cat. No. 2252*a*; I. U. Cat. No. 12428.)

Three specimens collected by Ehrhardt in the Essequibo, and now in the Berlin Museum, are evidently also of this species.

Head 3–3.25; depth 4–5.5; D. usually XVIII,14;[84] A. III,9 or 10. Scales in a series below the lateral line most frequently 55–61, rarely 52 and 62; eye 1 in the snout, 4 in the head, .7 in the interorbital in the young; 1.5 in the snout, 4.75 in the head, 1.5 in the interorbital in the adult.

Nares considerably nearer the eye than to the tip of the snout; maxillary extending beyond origin of the eye; scales cycloid on head, belly, and above the lateral line in front, elsewhere ctenoid; dorsal sometimes produced to the end of the rounded caudal.

Humeral spot entirely below the lateral line; a band from the eye to the humeral spot and frequently forward to the chin; a caudal spot at the base of the rays above the middle; sides frequently with white or light blue spots, which form an incomplete ring around the caudal and humeral spots; dorsal and anal spotted with white (especially towards the end); a black spot below the eye; caudal sometimes faintly barred, sometimes narrowly margined with white, often with a dark submarginal band, within which on the upper lobe there may be a series of white spots or a white band; back with about eight to ten obscure cross-bands; young with a faint, dark lateral band.

[84] Of thirty-eight specimens, four have 17, twenty-five have 18, nine have 19, and one has 20 spines; seven have 13, twenty-three have 14, and nine have 15 rays.

The specimens from Wismar and Christianburg differ from all those taken near the coast. The dorsal is margined with black, the black extending along the dorsal filament parallel to the margin; a narrow band or series of light spots, followed by a series of darker spots blending into a band, which becomes very wide on the last few rays, then another narrow light band, which, margining the darker, is curved down on the last dorsal rays; basal four-tenths of the dorsal darker; caudal with a black upper margin, a light line within it, and a black spot above the end of the lateral line, the rest nearly uniform dark; anal with a black margin and a submarginal light band, widest posteriorly, the base dusky. Twelve to fifteen dark cross-shades.

D. XX,14 in the largest; scales 62 along a series below the lateral line.

349. **Crenicichla alta** sp. nov. (Plate LXVIII, fig. 3.)

Type, 169 mm. Gluck Island. (Carnegie Museum Catalog of Fishes No. 2274*a*.)

Cotypes, fourteen specimens, 61–168 mm. Gluck Island. (C. M. Cat. No. 2254*a–e*; I. U. Cat. No. 12455.)

Cotypes, eight specimens, 66–205 mm. Aruataima. (C. M. Cat. No. 2257*a–d*; I. U. Cat. No. 12434.)

Cotypes, two specimens, 125–147 mm. Savannah Landing. (C. M. Cat. No. 2259*a*; I. U. Cat. No. 12443.)

Cotypes, four specimens, 52–138 mm. Tukeit. (C. M. Cat. No. 2260*a–b*; I. U. Cat. No. 12435.)

Cotypes, eight specimens, 42–188 mm. Amatuk. (C. M. Cat. No. 2261*a–d*; I. U. Cat. No. 12436.)

Cotypes, two specimens, 145–150 mm. Erukin. (C. M. Cat. No. 2262*a*; I. U. Cat. No. 12437.)

Cotypes, nine specimens, 62–182 mm. Holmia. (C. M. Cat. No. 2258*a–e*; I. U. Cat. No. 12442.)

Cotypes, two specimens, 137–162 mm. Potaro Landing. (C. M. Cat. No. 2263*a*; I. U. Cat. No. 12438.)

Cotypes, ten specimens, the smallest 78 mm. Rockstone. (C. M. Cat. No. 2253*a–c*; I. U. Cat. No. 12429.)

Cotype, one specimen, 125 mm. Twoca Pan. (C. M. Cat. No. 2264*a*.)

Cotypes, four specimens, 53–128 mm. Rupununi. (C. M. Cat. No. 2265*a–b*; I. U. Cat. No. 12440.)

Cotypes, nine specimens, 67–158 mm. Nickaparu Creek. (C. M. Cat. No. 2266*a–e*; I. U. Cat. No. 12441.)

Cotypes, five specimens, 42–61 mm. Konawaruk. (C. M. Cat. No. 2411*a–c*.)

Head 3.2–3.33; depth 3.75–5; D. usually XIX,14;[85] A. III,9 or 10. Scales in a series below the lateral line 62–69;[86] eye 4–5 in the head, 1–1.66 in the snout, .75–1.25 in the interorbital.

Nares nearer the eye than to the tip of the snout, maxillary extending beyond the origin of the eye in all sizes. A dark spot below the eye; a dark band from chin or eye to the opercle, and in the young (and even the old) from the Potaro and Rupununi, to the caudal; an ocellus on the base of the caudal above the end of the lateral line; the humeral spot above the lateral band in all but the smallest (from Amatuk), in which its center is on the lateral band. A submarginal light streak on the dorsal; bases of last dorsal and anal rays with oblique light bars or spots; caudal faintly barred.

In the smallest (from Amatuk) the lateral band is conspicuous from below the chin to the end of the middle caudal rays, the humeral spot is just creeping up from the lateral band, the caudal spot is ocellated above, but still continuous with the lateral band below, the upper caudal lobe is obliquely crossed by two light bars and an intermediate dark bar. There are a few spots on the head in front of the lateral line, and a faint band from the snout to between the eyes, where it divides, one passing back along either side of the dorsal, as in *C. lugubris*.

Sometimes with dark cross-shades on the back or narrow alternating cross-lines on the sides, especially in the Rockstone specimens; dorsal and caudal sometimes as in specimens of *C. saxatilis* from Wismar.

In specimens from Trinidad of so-called *saxatilis* the humeral spot is sometimes continuous with the lateral band and sometimes distinct but always on the lateral line.

350. Crenicichla wallacei Regan.

Crenicichla wallacei Regan, Proc. Zool. Soc. London, 1905, i, 163, pl. 14, fig. 2 (Essequibo).—von Ihering, Rev. Mus. Paulista, VII, 1907, 303.

Crenicichla wallacii Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 477.

A small species, hitherto known from a single specimen in the British Museum. It was without specific locality.

It is readily distinguished by the presence of even in the very young, of a distinct caudal spot, and by the short maxillary.

[85] Of thirty-one specimens nine have 18 and twenty-two have 19 spines; seven have 13, twenty-two have 14, and two have 15 rays.

[86] Three with 62, two with 63, one with 64, three with 65, one with 66, five with 67, and one with 69.

Eight specimens, 25–50 mm. Gluck Island. (C. M. Cat. No. 2269*a–d*; I. U. Cat. No. 12447.)

Eleven specimens, 40–60 mm. Konawaruk. (C. M. Cat. No. 2256*a–f*; I. U. Cat. No. 12432.)

Thirty-one specimens, 30–58 mm. Rockstone sand-bank. (C. M. Cat. No. 2270*a–c*; I. U. Cat. No. 12446.)

Two specimens, 53–60 mm. Rupununi. (C. M. Cat. No. 2271*a*; I. U. Cat. No. 12445.)

One specimen, 91 mm. Twoca Pan. (C. M. Cat. No. 2272.)

Three specimens, 59–85 mm. Crab Falls. (C. M. Cat. No. 2273*a–b*; I. U. Cat. No. 12444.)

One specimen, 77 mm. Tumatumari. (C. M. Cat. No. 2410.)

Head 3.5–3.66; depth 5.5–6; D. XX,10, more rarely XXI,9 and XXI,11; A. III,7–9. Scales in a series below the lateral line 64–70; eye 3.5–4 in the head, .7–.9 in the interorbital.

Scales on nape, head, and belly cycloid, elsewhere ctenoid; two full scales between the end of the upper lateral line and the dorsal. Soft dorsal and anal (in the largest) produced.

Nares a little nearer eye than to tip of upper lip; maxillary falling distinctly short of reaching the eye.

A dark brown band from the chin through the eye to the end of the caudal, fading on the sides and caudal with age. No humeral spot, but a small ocellus at the base of the caudal, a little above its middle, more distinct in the young than in the old; back in the young with seven or eight cross-bars; middle of caudal and end of soft dorsal (in the adult) with spots or cross-shades.

351. **Crenicichla lugubris** Heckel.

Crenicichla lugubris Heckel, Ann. Wiener Mus., II, 1840, 422 (Rio Negro).—Müller and Troschel, in Schomburgk, Reisen, III, 1848, 626 (Essequibo and neighboring swamps).—Regan, Proc. Zool. Soc. London, 1905, i, 165 (Rio Capin; Essequibo).—von Ihering, Rev. Mus. Paulista, VII, 1907, 306.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 478.

Crenicichla johanna lugubris Günther, Catalogue, IV, 1862, 307.

Crenicichla brasiliensis lugubris Pellegrin, Bull. Mus. d'Hist. Nat., VIII, 1902, 182 (Manaos; Tonantins); "Cichlidés," 347, in Mém. Soc. Zool. France, XVI, 1903, 383, fig. 3.

Crenicichla funebris Heckel, Ann. Wiener Mus., II, 1840, 424.

Crenicichla johanna funebris Günther, Catalogue, IV, 1862, 307.

Cychla rutilans SCHOMBURGK, Fishes Brit. Guiana, II, 1843, 142, pl. 5 (Rio Branco).

? *Crenicichla vittata* MÜLLER and TROSCHEL, in Schomburgk, Reisen, III, 1848, 626 (Essequibo and Lakes Tapacuma and Capoye).

? *Crenicichla johanna vittata* (not of Heckel) GÜNTHER, Catalogue, IV, 1862, 306.

? *Crenicichla brasiliensis vittata* PELLEGRIN, "Cichlidés," 345, in Mém. Soc. Zool. France, XVI, 1903, 381.

? *Crenicihla johanna strigata* GÜNTHER, Catalogue, IV, 1862, 306.

One specimen, 140 mm. Amatuk. (C. M. Cat. No. 2231.)

One specimen, 86 mm. Warraputa. (C. M. Cat. No. 2232.)

One specimen, 100 mm. Crab Falls. (I. U. Cat. No. 12414.)

Two specimens, 197–227 mm. Bartica. (C. M. Cat. No. 2233*a*; I. U. Cat. No. 12415.)

One specimen, about 160 mm. Rockstone. (C. M. Cat. No. 2268.)

One specimen, 300 mm. Tumatumari. (C. M. Cat. No. 2234.)

Two specimens, 230–255 mm. Tukeit. (C. M. Cat. No. 2235; I. U. Cat. No. 12416.)

Two specimens, 50–51 mm. Waratuk. (C. M. Cat. No. 2236; I. U. Cat. No. 12439.)

Head 3–3.2; depth 4.5–5.33; D. usually XXIII,16, or rarely XX,15; A. III,10 or 11; scales in a series below the lateral line about 100–109. Eye 5.5 in the head, 1.4 in the interorbital, 5 and .8 respectively, in the young; anterior nares half-way between tip of snout and eye.

Maxillary extending to below the anterior margin of the eye. Scales all ctenoid. A black spot at the base of the middle caudal rays. Adult: uniform dark above, somewhat lighter below; fins uniform. Young (86–140 mm.): second dorsal, caudal, and anal reddish, pectoral yellowish; spots on lower half of cheeks and chin; a narrow line across the chin and snout to eye and from the eye to end of opercle, continued on the side as a broader but less intense band of black, which may be bordered above and below by light; a second dark line from the eye along the upper section of the lateral line, a third from the tip of the snout to between the eyes, then dividing and extending to the end of the head, from where it is continued as a series of small streaks or spots along either side of the dorsal; spots between the second and third stripes on the head; caudal with a black spot at the base of the middle rays, surrounded by an arrow-shaped dark area, this bordered by a light band above and below, beyond this dark again; base of dorsal dusky, a submarginal black band; anal with a dusky margin.

The smallest specimens have no spots about the head, the lateral band is

black and extends to the tip of the caudal, and there are traces of cross-bands on the back.

352. Crenicichla johanna Heckel.

Crenicichla johanna Heckel, Ann. Wiener Mus., II, 1840, 417 (Rio Guaporé).—Regan, Proc. Zool. Soc. London, 1905, i, 168 (Rio Capin; Rio Cupai; L. Hyanuary).—von Ihering, Rev. Mus. Paulista, VII, 1907, 307.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 478.

Crenicichla johanna johanna Günther, Catalogue, IV, 1862, 306 (Rio Cupai).

Crenicichla brasiliensis johanna Pellegrin, Bull. Mus. d'Hist. Nat., VIII, 1902, 182 (Marajo; Pará; Teffé; Tonantins); "Cichlidés," 347, in Mém. Soc. Zool. France, XVI, 1903, 383, fig. 42, 6 (Orinoco; Amazon; Marajo).

Cychla fasciata Schomburgk, Fishes Brit. Guiana, II, 1843, 141, pl. 4.

One specimen, 132 mm. Below Packeoo. (C. M. Cat. No. 2237.)

Eight specimens, 113–215 mm. Below Potaro Landing. (C. M. Cat. No. 2238*a–b*; I. U. Cat. No. 12417.)

One specimen, 252 mm. Crab Falls. (C. M. Cat. No. 2239*a*.)

Three specimens, 104–280 mm. Wismar. (C. M. Cat. No. 2240*a–b*; I. U. Cat. No. 12418.)

Three specimens, 215–272 mm. Lama Stop-Off. (C. M. Cat. No. 2241*a–b*; I. U. Cat. No. 12419.)

One specimen, 283 mm. Tumatumari. (C. M. Cat. No. 2242*a*.)

Three specimens, 229–234 mm. Maduni Stop-Off. (C. M. Cat. No. 2243*a–b*; I. U. Cat. No. 12420.)

Head 3.4; depth 4–5; D. XXI or XXII,16 or 17; A. III,11; scales 109–113 in a series below the lateral line; eye 5–5.5 in the head, 1.5–1.7 in the interorbital; anterior nares very close to the lip, much nearer tip of snout than to eye.

Maxillary extending a little beyond the anterior margin of the eye. Scales cycloid, imbedded, those of the opercles and top of the head smaller in Lama and Maduni specimens than in those from other localities.

Adult uniform dark above, a little lighter below, rarely a submarginal red (white) stripe on the dorsal and upper part of caudal.

Young with small black dots on the head and upper half of body, arranged into longitudinal lines on the sides; back with numerous cross-shades; no caudal spot. Caudal in the young sometimes narrowly margined with light, then with a broad black crescent, then another light crescent, the base and middle of the fin dark.

Pterophyllum Heckel.

Pterophyllum Heckel, Ann. Wiener Mus., II, 1840, 334.

Plataxoides Castelnau, Anim. Am. Sud, Poiss., 1855, 21, pl. 11, fig. 3.

Type, *Platax scalaris* Cuvier and Valenciennes.

Greatly compressed and deep; dorsal and anal spines graduated, the last forming parts of elevated lobes; gill-arch without a lobe, rakers stiff, of moderate length.

353. **Pterophyllum scalare** (Cuvier and Valenciennes).

Platax scalaris Cuvier and Valenciennes, Hist. Nat. Poiss., VII, 1831, 237 (Brazil).

Pterophyllum scalaris Heckel, Ann. Wiener Mus., II, 1840, 335 (Barra do Rio Negro).—Günther, Catalogue, IV, 1862, 316 (River Cupai).—Steindachner, "Chromiden Amazonenstromes," in SB. Akad. Wiss. Wien, LXXI, 1875, 76 (Santarem; Montalegre; Villa Bella; Obidos; Coary; Ueranduba; Tonantins; Tabatinga; Hyutay; Xingu; Lago Manacapurú; Lago Maximo; Barra do Rio Negro).—Eigenmann and Bray, Ann. N. Y. Acad. Sci., VII, 1894, 624.—Pellegrin, Bull. Mus. d'Hist. Nat., VIII, 1902, 183 (Marajo; Teffé; Tonantins; Tabatinga); "Cichlidés," 215, in Mém. Soc. Zool. France, XVI, 1903, 251 (Peru; Teffé; Amazon).—Regan, Ann. and Mag. Nat. Hist., (7), XVI, 1905, 441.—von Ihering, Rev. Mus. Paulista, VII, 1907, 335.—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 479.

Plataxoides dumerilii Castelnau, Anim. Am. Sud, Poiss., 1855, 21, pl. 11, fig. 3 (Pará).

Four specimens, 44–77 mm. to the end of the middle caudal rays. Rupununi. (C. M. Cat. No. 2355*a–b*; I. U. Cat. No. 12502.)

Six specimens, 52–64 mm. to end of middle caudal rays. Rockstone. (C. M. Cat. No. 2356*a–c*; I. U. Cat. No. 12503.)

Seven specimens, 65–69 mm. to end of middle caudal rays. Crab Falls. (C. M. Cat. No. 2357*a–d*; I. U. Cat. No. 12504.)

Head 3; depth 1.25; D. XI–XII,24 or 25; A. VI,26; lateral line 18 or 19 + 13 $\frac{4}{2}$; scales 36–40 in a median series; eye 2.8 in the head, 1 in interorbital, .4 in preorbital.

Compressed; profile depressed, the snout pointed; maxillary reaching to below the eye; maxillary-premaxillary border 3.5 in the head.

Cheeks with about four series of scales; a series of scales on the lower limb of the preopercle and another on the interopercle; scales ctenoid, about eight scales between the lateral line and the dorsal; dorsal and anal with a triangular patch of scales, the apex of the triangle on the last spines or first ray. A few scales at the base of the caudal.

Dorsal and anal spines graduated from the first to the last; dorsal and anal rays graduated from the last to the first, the lobes at these points diverging, reaching beyond the caudal; ventral filaments extending beyond the anal lobe; pectoral not quite as long as the head; caudal emarginate, the outer rays prolonged.

Silvery below, dusky above; a dark bar down from the eye, the bars of opposite sides united in front of the ventrals; a dark bar from under the fifth dorsal spine to in front of the anal; a dark bar connecting the dorsal and anal lobes; a dark bar at the base of the caudal, fainter bands between each pair of the foregoing; caudal with four cross-bands; dorsal lobe dark, the posterior part of the fin hyaline, its base and two bars dark; anal lobe dark, three bars on the posterior part of the fin. Ventral filaments white.

FAMILY XXIV. POLYCENTRIDÆ.

Polycentrus Müller and Troschel.

Polycentrus Müller and Troschel, in Schomburgk, Reisen, III, 1848, 622.

Type, *Polycentrus schomburgkii* Müller and Troschel.

Compressed, scaled; no lateral line; ventrals thoracic; teeth feeble; pseudobranchiæ hidden; mandible without barbels; dorsal and anal spines numerous.

354. **Polycentrus schomburgki** Müller and Troschel.

Polycentrus schomburgkii Müller and Troschel, in Schomburgk, Reisen, III, 1848, 622; Horæ Ichth., III, 1849, 25, pl. 5, fig. 2 (Essequibo).—Günther, Catalogue, I, 1859, 396; III, 1861, 370 (Essequibo).—Regan, Proc. Zool. Soc. London, 1906, i, 391, pl. 25, fig. 2 (Trinidad).—Eigenmann, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 466.

Polycentrus tricolor Gill, Ann. Lyc. Nat. Hist. N. Y., VI, 1858, 373 (Trinidad).

One specimen, 32 mm. Aruka River. (C. M. Cat. No. 2451.)

Two specimens, 27–30 mm. Cane Grove Corner. (C. M. Cat. No. 2422*a–b*; I. U. Cat. No. 12539.)

One specimen, 35 mm. Georgetown trenches. (C. M. Cat. No. 2452.)

Thirty-nine specimens, 22–43 mm. Botanic Garden. (C. M. Cat. No. 2417*a–f*; I. U. Cat. No. 12540.)

Nine specimens, 30–50 mm. Maduni Creek. (C. M. Cat. No. 2418*a–c*; I. U. Cat. No. 12541.)

Five specimens, 25–47 mm. Canal at Christianburg. (C. M. Cat. No. 2419*a–c*; I. U. Cat. No. 12542.)

Seven specimens, 47–55 mm. Kumaka. (C. M. Cat. No. 2420*a–d*; I. U. Cat. No. 12543.)

Thirty-six specimens, 19–55 mm. Lama Stop-Off. (C. M. Cat. No. 2421*a–f*; I. U. Cat. No. 12544.)

Head 2.6; depth 2.3; D. XVI–XVII,8–9; A. XIII,6–7; scales 25–27; eye 3.5 in the head, .8 in interorbital.

Oval, the snout pointed, the premaxillary greatly protractile, the maxillary reaching beyond the middle of the eye; angle and lower margin of preopercle serrate, the posterior margin smooth; ten short rakers on the lower gill-arch.

Scales ctenoid; entire side of head to the maxillary, and top of head to between the anterior margins of the eye scaled; no lateral line; anal spines depressible into a scaly groove; a few scales at base of anal and caudal. Spines of dorsal and anal low, the articulate rays abruptly higher.

Variegated and variously colored, the soft dorsal, anal, and caudal hyaline.

Family XXV. GOBIIDÆ.[87]

Key to the Guiana Genera of Gobiidæ.

a. Ventrals separate from each other; vomer without teeth.
b. Preopercle without spine; head naked.
c. Scales large, less than fifty in a median series..... **Dormitator.**
cc. Scales small, more than one hundred in a median series..... **Guavina.**
bb. Preopercle with a downward and forward directed spine at its angle; scales moderate..... **Eleotris.**
aa. Ventrals united, free from the abdomen.
d. Teeth emarginate, in a single series in each jaw..... **Evorthodus.**
dd. Teeth simple, body scaly; maxillary normal; dorsal spines six; interorbital area not elevated; inner edge of shoulder-girdle without fleshy cirri or papillæ..... **Gobius.**[88]

Dormitator Gill.

Prochilus Cuvier, Règne Animal, ed. 1, II, 1817, 294, preoccupied.

Dormitator Gill, Proc. Acad. Nat. Sci. Phila., 1862, 240.

Type, *Dormitator gundlachi* Poey = *Dormitator maculatus* (Bloch).

Ventrals not united; vomer without teeth; no spine on preopercle; scales large; lower pharyngeals with an outer series of broad, flexible, lamelliform appendages.

355. Dormitator gymnocephalus sp. nov.

Type, 18 mm. Konawaruk. (Carnegie Museum Catalog of Fishes No. 2438.)

Head 3.4; depth 6; D. VI,6; A. 9; scales 26 in a median series; eye about .7 in the snout, 3 in the head; interorbital very narrow, somewhat grooved. Skull smooth above.

Mouth large, maxillary reaching to below the pupil; no teeth on the vomer;

[87] *Gobius bacalaus* Müller and Troschel, in Schomburgk, Reisen, III, 1848, 623 (coast of Guiana).

[88] *Gobius oceanicus* Pallas is recorded from the coast as *G. bacalaus*.

jaws with conical, depressible teeth; gill-membranes free to below the posterior part of the eye.

Top of skull covered with chromatophores, a few chromatophores along the sides.

This species differs from the typical *Dormitator* in having the head naked. The single specimen (of small size) does not enable me to do more than call attention to this species.

ELEOTRIS Bloch and Schneider.

Elcotris GRONOW, Zoophyl., 1763, 83.—BLOCH and SCHNEIDER, Syst. Ichth., 1801, 65 (*pisonis*).

Culius BLEEKER, Arch. Néer. Sci. Nat., IX, 1874, 303 (*fuscus*).

Type, *Gobius pisonis* Gmelin.

Ventrals separate; vomer without teeth; isthmus broad; lower pharyngeals normal; depth 4–5.5 in the length; preopercle with a partly concealed spine.

356. **Eleotris amblyopsis** Cope.

Culius amblyopsis COPE, Trans. Am. Philos. Soc., XIV, 1871, 473 (Surinam).—JORDAN and EIGENMANN, Proc. U. S. Nat. Mus., IX, 1886, 483.—EIGENMANN and EIGENMANN, Proc. Cal. Acad. Sci., (2), 1, 1888, 55 (Surinam).—JORDAN and EVERMANN, Bull. U. S. Nat. Mus. No. 47, III, 1898, 2199.—EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 480.

Two specimens, 42–58 mm. Mora Passage. (C. M. Cat. No. 2439; I. U. Cat. No. 12556.)

One specimen, 51 mm. Georgetown trenches. (C. M. Cat. No. 2440.)

Head 3.25; depth 4.3; D. VI,10; A. 9; scales 40–43 in a median series; eye 1.5 in the snout, 6 in the head, 1.3 in the interorbital.

Chocolate-brown. Vertical fins barred; caudal darkest.

GUAVINA Bleeker.

Guavina BLEEKER, Arch. Néer. Sci. Nat., IX, 1874, 302.

Type, *Eleotris guavina* Cuvier and Valenciennes.

Ventrals separate; vomer without teeth; lower pharyngeals normal; scales small; preopercle without a spine.

357. **Guavina guavina** (Cuvier and Valenciennes).

Eleotris guavina CUVIER and VALENCIENNES, Hist. Nat. Poiss., XX, 1837, 223 (Martinique).—MULLER and TROSCHEL, in Schomburgk, Reisen, III, 1848, 623 (mouths of rivers).

Guavina guavina JORDAN and EIGENMANN, Proc. U. S. Nat. Mus., 1886, 483.—JORDAN and EVERMANN, Bull. U. S. Nat. Mus. No. 47, III, 1896, 2198.—EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 480.

No specimens were obtained. It was taken by Schomburgk, one of whose specimens is in the Berlin Museum.

Head 3.5; depth 4.5–5.25; D. VI, or VII–1,10; A. 1,9 or 10; maxillary 2.5–3.5 in the head. Maxillary reaching opposite middle of eye; scales 100–110 in a longitudinal series.

EVORTHODUS Gill.

Evorthodus GILL, Proc. Acad. Nat. Sci. Phila., 1859, 195.

Type, *Evorthodus breviceps* Gill.

Ventrals united, free from the abdomen; teeth emarginate, in a single series; head very blunt; interorbital very narrow.

358. Evorthodus breviceps Gill.

Evorthodus breviceps GILL, Proc. Acad. Nat. Sci. Phila., 1859, 195 (Trinidad).—GÜNTHER, Catalogue, III, 1861, 85 (Trinidad; Surinam).—JORDAN and EIGENMANN, Proc. U. S. Nat. Mus., IX, 1886, 486.—JORDAN and EVERMANN, Bull. U. S. Nat. Mus. No. 47, III, 1898, 2208.—REGAN, Proc. Zool. Soc. London, 1906, i, 393 (Trinidad).—EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 481.

Two specimens, 30–33 mm. Aruka River. (C. M. Cat. No. 2441; I. U. Cat. No. 12555.)

Head 4; depth 4.33; D. V,11; A. 12; scales 30; eye 3+ in the head, .25 in the interorbital.

Head very blunt, the mouth low, horizontal; gill-membranes broadly united to the isthmus, which is greater than the orbit. Scales of breast and before dorsal and on belly small, those of the sides large, eleven scales between the anus and the spinous dorsal.

Sides mottled; tail with three cross-shades; a black spot at the base of each caudal lobe; first dorsal with a black band.

Order HETEROSOMATA.

Family XXVI. SOLEIDÆ.

KEY TO THE GUIANA GENERA OF SOLEIDÆ.

a. Gill-openings large, confluent below; ventrals of the two sides of nearly equal size; caudal free from the dorsal and anal; scales etenoid, those of the head enlarged, the scales on the blind side of the head fringed. **Achirus.**

aa. Gill-openings small, narrow slits on the sides of the head; snout produced into a pendant reaching the origin of the ventrals; scales well-developed.

b. Both ventrals well-developed.....**Achiropsis.**

bb. Left ventral reduced to one or two minute rays near the anus; eyes rudimentary, the space between them about five times the diameter.....**Apionichthys.**

bbb. Left ventral absent; eyes well-developed, the space between them about equal to the diameter. **Soleonasus.**

ACHIRUS Lacépède.

Achirus LACÉPÈDE, Hist. Nat. Poiss., IV, 1803, 659 (*fasciatus*, etc.).—CUVIER, Règne Animal, ed. 2, II, 1829, 343 (restricted to *fasciatus*, etc.).

Trinectes RAFINESQUE, Atlantic Journal and Friend of Knowledge, I, 1832,— (*scabra*).

Grammichthys KAUP, Archiv für Naturg., XXIV, 1858, 94 (*lineatus* and *fasciatus*; *Achirus* restricted to *Pardachirus barbatus*, etc.).

Monochirus KAUP, Archiv für Naturg., XXIV, 1858, 94 (*maculipinnis*), not of Rafinesque, 1814, a genus of *Soleinæ*.

? *Aseraggodes* KAUP, Archiv für Naturg., XXIV, 1858, 103 (*guttulata*).

Baiostoma BEAN, Proc. U. S. Nat. Mus., V, 1882, 413 (*brachiale*).

Barostoma JORDAN and GILBERT, Synopsis Fishes N. Am., 1883, 965 (emended orthography).

Jaws equal; ventrals nearly equally developed, not continuous with the anal, their origin remote from the chin; scales etenoid, a margin about the blind side of the head with profuse fringes; lateral line straight.

359. Achirus lineatus (Linnæus).

"Passer lineis tranversis notatus" SLOANE, Jamaica, II, 1725, 277, pl. 246, fig. 2 (Jamaica).

"Pleuronectes fuscus subrotundus glaber" BROWNE, Jamaica, 1756, 445 (Jamaica).

Pleuronectes lineatus LINNÆUS, Syst. Nat., ed. 10, I, 1758, 268 (Jamaica), based on Browne and Sloane; not of ed. 12, which is *Achirus fasciatus*.

Monochir lineatus QUOY and GAIMARD, Voy. Uranie et Physicienne, Zool., 1824, 238.

Achirus lineatus VALENCIENNES, in d'Orbigny, Voy. Am. Mer., V, ii, 1847, pl. 16, fig. 2.—JORDAN and GOSS, Ann. Rept. U. S. Fish Com. for 1886, 1889, 312.—JORDAN and EVERMANN, Bull. U. S. Nat. Mus. No. 47, III, 1898, 2697 (Coary; Teffé; Tapajos; Porto Alegre; Pernambuco; Cannavierias; Manacapurú; Porto do Moz; Rio Grande do Sul; Rio Janeiro; San Matheo; Rosario; Itabapuana; Obidos; Xingu; Gurupa; Jutahy; Curaçao; Pará; Bahia; Santarem; Iça; Fonteboa; San Paolo; Rio Trombetas; Sambaia; Maues;

Javary; Tabatinga).—Eigenmann, Proc. Wash. Acad. Sci., VIII, 1907, 456 (Buenos Aires); Repts. Princeton Univ. Exp. Patagonia, III, 1910, 483.

Monochir maculipinnis Agassiz, Selecta Gen. et Spec. Pisc. Bras., 1829, 88, pl. 49 (Brazil).—Poey, Repert. Fis.-Nat. Cuba, II, 1868, 409.

Solea maculipinnis Günther, Catalogue, IV, 1862, 473.—Kner, Reise Novara, Fische, III, 1866, 289.

Achirus maculipinnis Jordan, Proc. U. S. Nat. Mus., IX, 1886, 602.

Four specimens, 62–90 mm. Rockstone. (C. M. Cat. No. 2413*a–b*; I. U. Cat. No. 12545.)

Two specimens, 158–163 mm. Tumatumari. (C. M. Cat. No. 2414*a*; I. U. Cat. No. 12546.)

Twenty-seven specimens, 35–230 mm. Georgetown market. (C. M. Cat. No. 2415*a–g*; I. U. Cat. No. 12547.)

One specimen, 28 mm. Georgetown trenches. (C. M. Cat. No. 2453.)

Head 3.5–4; depth 1.5–1.9; D. 53–56; A. 40; lateral line 70; eye 7 in the head; depth of caudal peduncle 1.2 in the head.

Pectorals of the right side much longer than the eye, but none on the left side; body gray, with six to eight black vertical lines; fins colored like the body, the caudal sometimes all or partly white. Fins spotted in the young.

Apionichthys Kaup.

Apionichthys Kaup, Archiv für Naturg., XXIV, 1858, 114 (*dumerili*).

Solcotalpa Günther, Catalogue, IV, 1862, 489 (*unicolor*).

Right ventral beginning at the chin, confluent with but readily distinguishable from the anal; right lower lip fringed; eyes minute.

360. **Apionichthys unicolor** Günther. (Plate LXX, fig. 1.)

Apionichthys dumerili Kaup, Archiv für Naturg., XXIV, 1858, 104 (no locality).—Bleeker, Nederl. Tijdschr. Dierk., II, 1865, 305.—Steindachner, "Ichthyologische Beiträge," viii, 1878, 48.

Solcotalpa unicolor Günther, Catalogue, IV, 1862, 489 (West Indies).

Apionichthys unicolor Jordan, Proc. U. S. Nat. Mus., IX, 1886, 603.

Apionichthys nebulosus Peters, MB. Akad. Wiss. Berlin, 1869, 709 (Surinam).

? *Apionichthys bleekeri* Horst, Nederl. Tijdschr. Dierk., IV, 1878, 30 (locality unknown).

Two specimens, 71–85 mm. Georgetown market. (C. M. Cat. No. 2412*a*; I. U. Cat. No. 12548.)

Head 4.3; depth 2.8; D. 68–73; A. 52–54; ventrals 5–1.

Ovate-lanceolate; depth of caudal peduncle more than 2 in the head to the chin; dorsal and anal more or less confluent with the lanceolate caudal, which is a little longer than the head. Scales ctenoid, increasing in size toward the anterior part of the dorsal and anal, and snout; lateral line straight; about eighty-six series of scales; a row of scales along each ray of the dorsal and anal; blind side of the anterior part of the head and snout with fringes, a large tuft on the snout just in front of the mouth.

Light gray, with rounded or vertical blotches of dark; each scale narrowly margined with black, those of the sides with a faint median longitudinal line.

SOLEONASUS[89] gen. nov.

Type, *Soleonasus finis* sp. nov.

Similar to *Apionichthys*, but the left ventral entirely wanting, and the eye large, about equal to the interorbital.

361. **Soleonasus finis** sp. nov. (Plate LXX, figs. 2, 3.)

Type, 80 mm. Tumatumari. (Carnegie Museum Catalog of Fishes No. 2487.)

Cotype, 92 mm. Tumatumari. (I. U. Cat. No. 12549.)

Head 4; depth 2.5; D. 64; A. 48; ventrals 5, 0; eye greater than the interorbital, 6 in the head (from the chin to the gill-opening.)

Elongate-oval; depth of caudal peduncle about equal to the length of the head from the gill-opening to the chin. Dorsal and anal well separated from the caudal, which is short, 4 in the length.

Scales small, ctenoid; lateral line straight; anal rays and posterior dorsal rays scaled, the entire dorsal scaled anteriorly; scales not increased in size towards the fins or snout; scales of the blind side of the snout thin, deciduous, fringed. About eighty series of scales.

Sand-color, with about seven faint vertical lines.

Order **PLECTOGNATHI.**

Family XXVII. TETRAODONTIDÆ.

Puffers.

COLOMESUS Gill.

"Les Batrachopes" BIBRON, Rev. Zool., (2), VII, 1855, 279 (*psittacus*).

Batrachops HOLLARD, Ann. Sci. Nat., (4), VIII,1857, 321 (*psittacus*), preoccupied.

[89] *Solea*, a sole; *nasus*, nose.

Colomesus GILL, Proc. U. S. Nat. Mus., VII, 1884, 422 (*psittacus*).

Type, *Tetrodon psittacus* Bloch and Schneider.

Frontals narrow, excluded from the orbit; postfrontals joined with the frontals; snout obtuse; dorsal and anal short, rounded.

362. **Colomesus psittacus** (Bloch and Schneider).

"Ostracion tetraodon" SEBA, Locupl. Rer. Nat. Thes. Acc. Descr., III, 1748, — (pre-Linnæan).

Tetrodon psittacus BLOCH and SCHNEIDER, Syst. Ichth., 1801, 505 (Malabar).—GÜNTHER, Catalogue, VIII, 1870, 286.

Chelichthys psittacus MÜLLER and TROSCHEL, in Schomburgk, Reisen, III, 1848, 641 (mouth of Waini and Barima).—STEINDACHNER, "Ichthyologische Mittheilungen," ii, 1861, 141, pl. 4, fig. 2.

Colomesus psittacus EIGENMANN, Repts. Princeton Univ. Exp. Patagonia, III, 1910, 484.

Chelichthys asellus MÜLLER and TROSCHEL, in Schomburgk, Reisen, III, 1848, 641 (Guiana).

Twenty-four specimens, 38–89 mm. Sand-bank at Bartica. (C. M. Cat. No. 2425*a–f*; I. U. Cat. No. 12554.)

Head 3; depth 3.66; D. 10; A. 10; eye 1 in the snout, 4 in the head, 2.5 in the interorbital.

Three cross-bars on the head, the middle one between the eyes; a triangular spot on the back at the base of the dorsal, a large saddle-shaped spot on the back in front of this, and an irregular spot on the caudal peduncle dorsad, more or less connected with an oval black spot on the caudal peduncle ventrad; a black spot around the base of the anal; another around the base of the pectoral; distal half of caudal black; the spots variable and sometimes fusing with age.

CHAPTER IX.

BIBLIOGRAPHY.

In the following pages an attempt has been made to bring together the titles of all papers dealing with the fishes of South America. They are arranged alphabetically according to the names of the authors, and chronologically under each author's name.

In the body of the work papers are usually quoted by the place of publication. In a number of cases, where a given paper forms a separate work, or where it is well known and easily accessible in the "separate" form, especially when the serial in which it occurs is rare and difficult of access, the work is cited by its title (enclosed in quotation marks) and by the page of the separate. The author, title, and date of publication being given there should be no difficulty in locating such papers in the following bibliography.[90]

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[90] *Note by the Editor.*—The Bibliography submitted by Dr. Eigenmann, based upon that published by him in Volume III of the Reports of the Princeton University Expeditions to Patagonia, 1896–1899 (1910), was found upon examination in some respects to call for revision and Mr. W. E. C. Todd was therefore instructed by the Editor to go over the work and verify all the references, which he did, availing himself of the facilities in our own library and in that of the Academy of Natural Sciences of Philadelphia. The Bibliography here given is not to be accepted as absolutely complete, as it is known that some papers upon the South American Freshwater Fishes have been omitted by the author, but is believed to accurately give the titles and location of the papers which are cited, and which are those of the greatest importance to the student.

The Editor desires to express his sense of obligation to Mr. W. E. C. Todd for his painstaking revision of this part of the manuscript.

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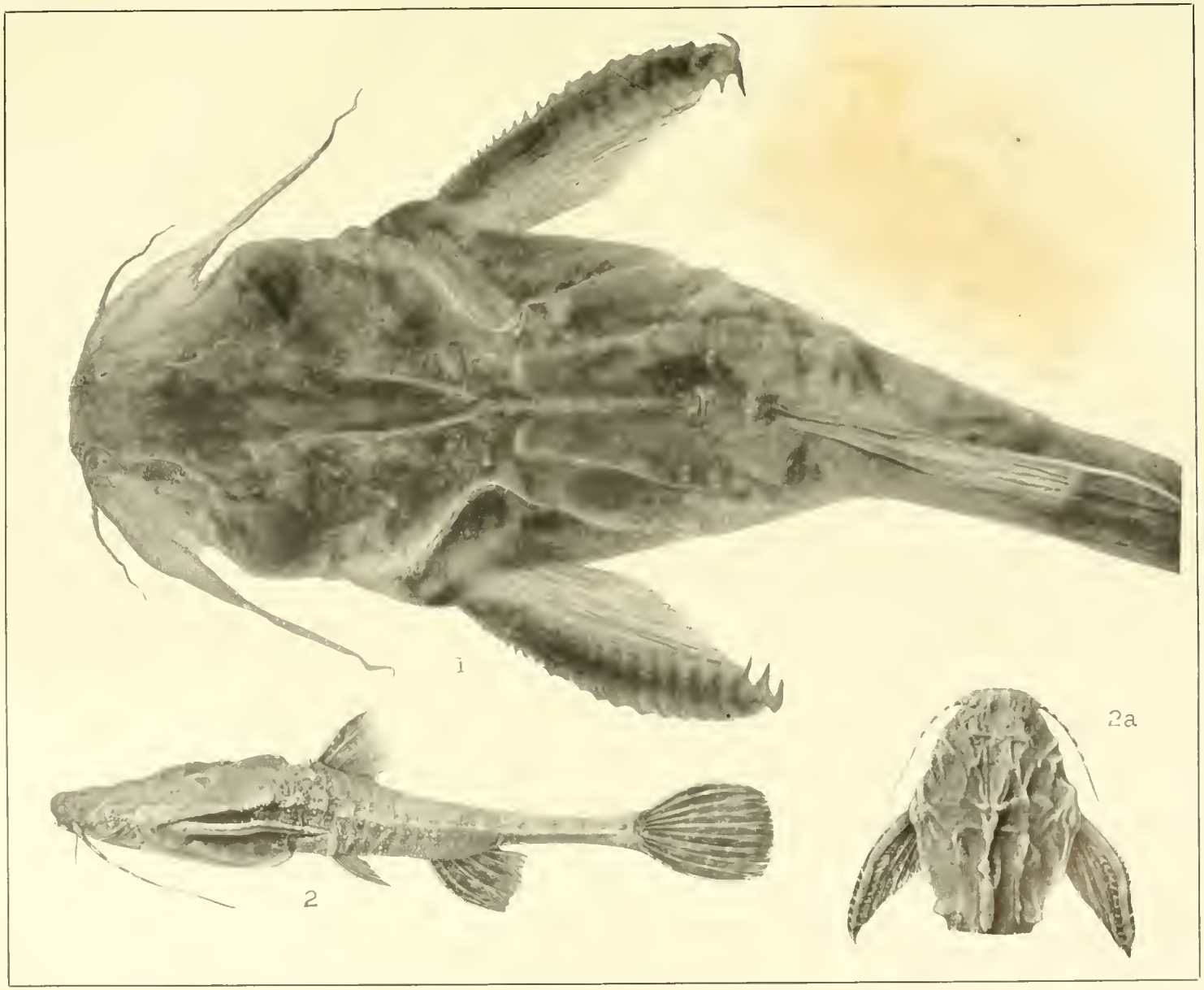

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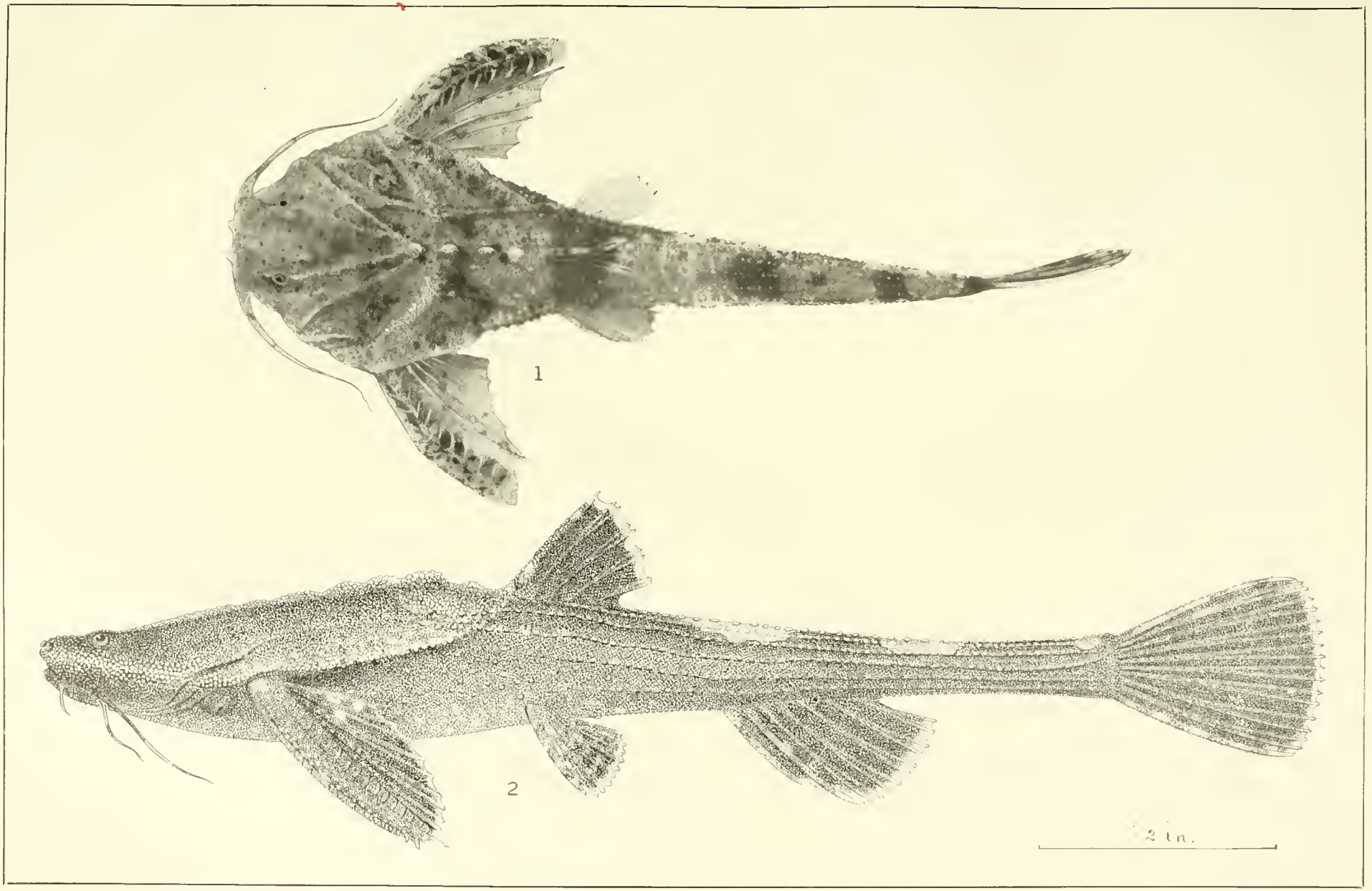
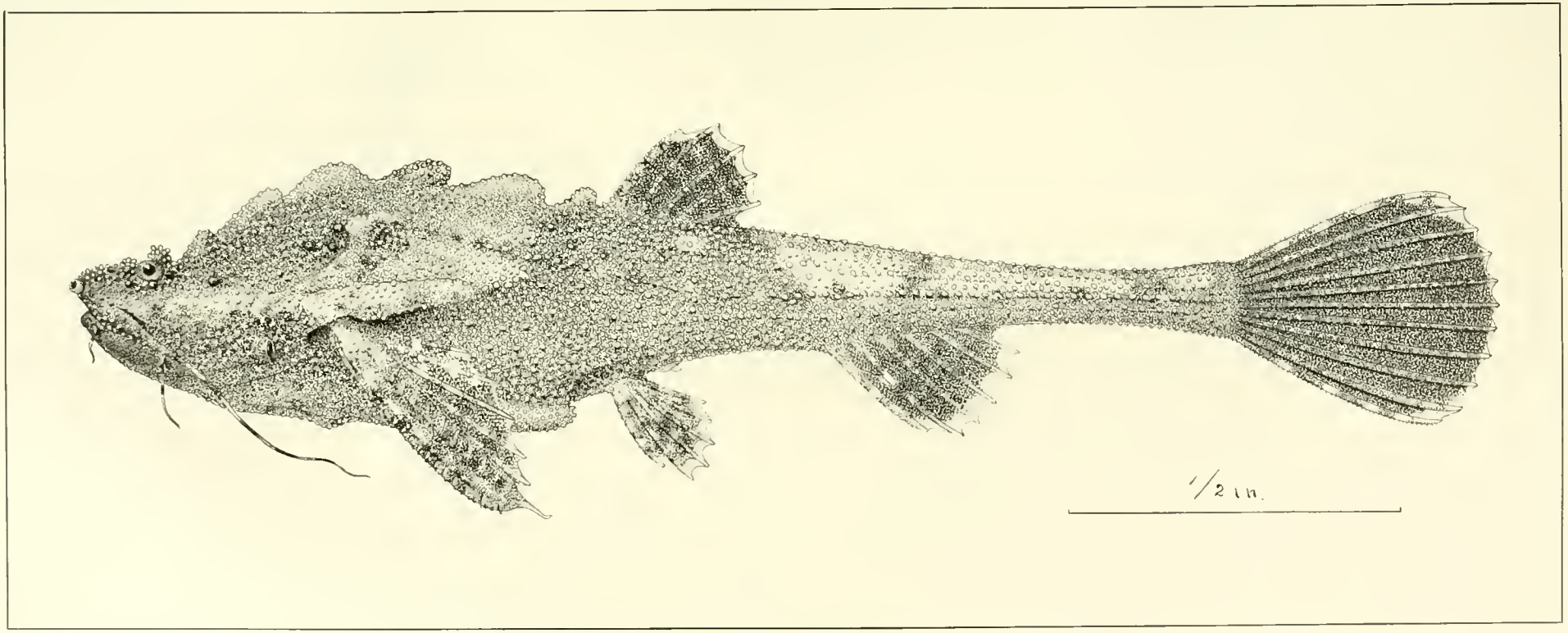
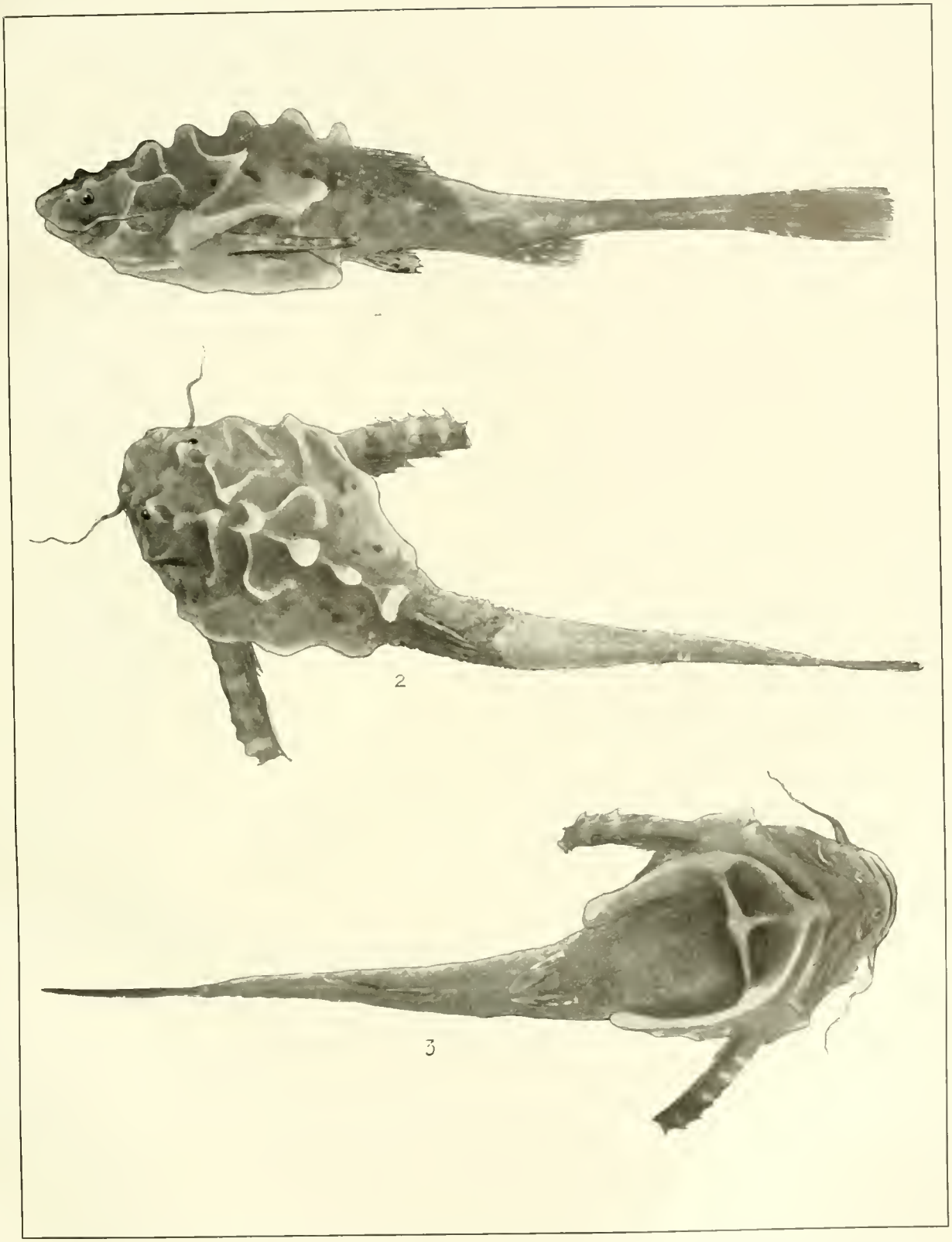


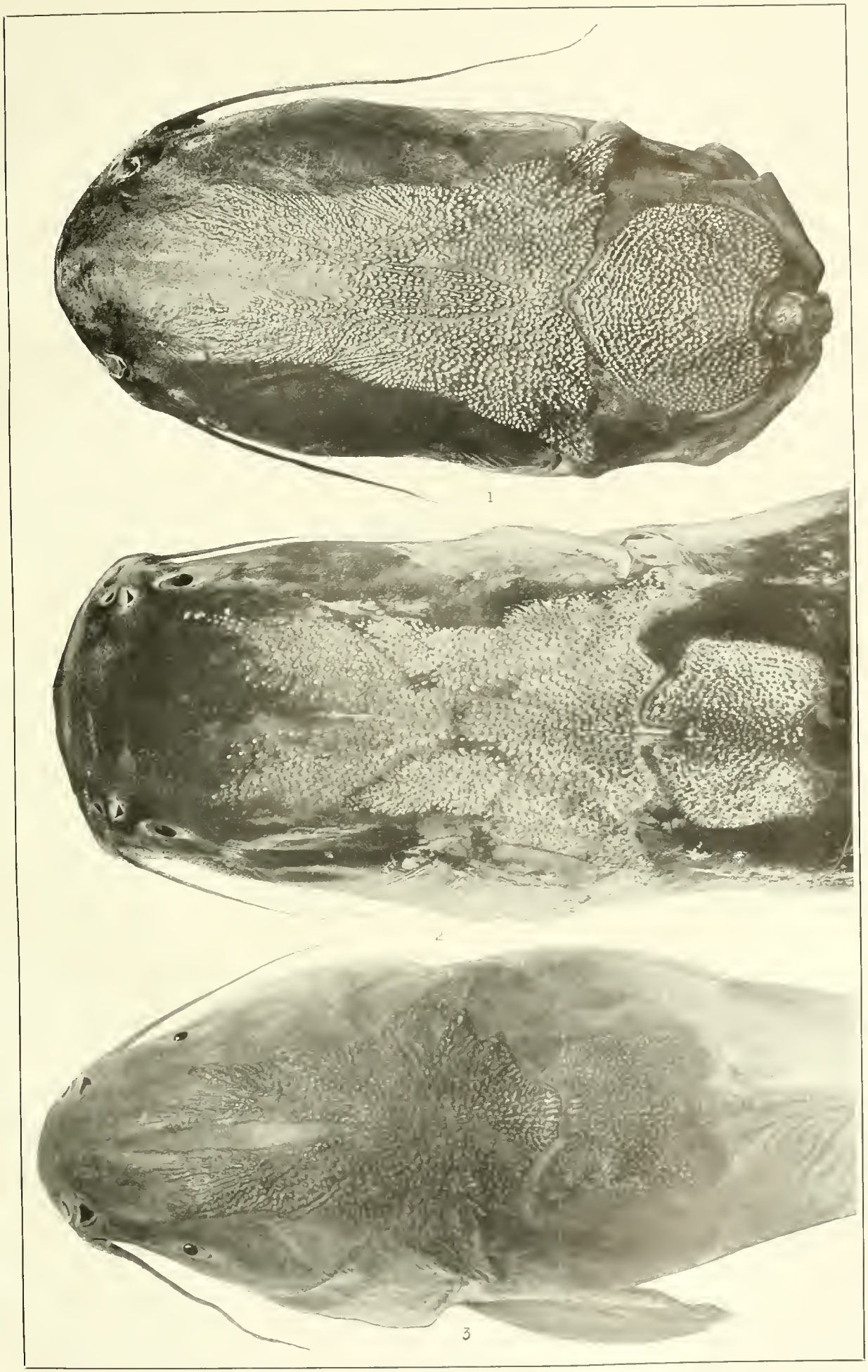
1. *Bunocephalus chamaizelus* EIGENMANN. (Type.) 36 mm. No. 1556. 2. *Bunocephalus amaurus* EIGENMANN. (Type.) 69 mm. No. 1556.



Agmus lyriformis EIGENMANN. (Type.) 56 mm. No. 1554.

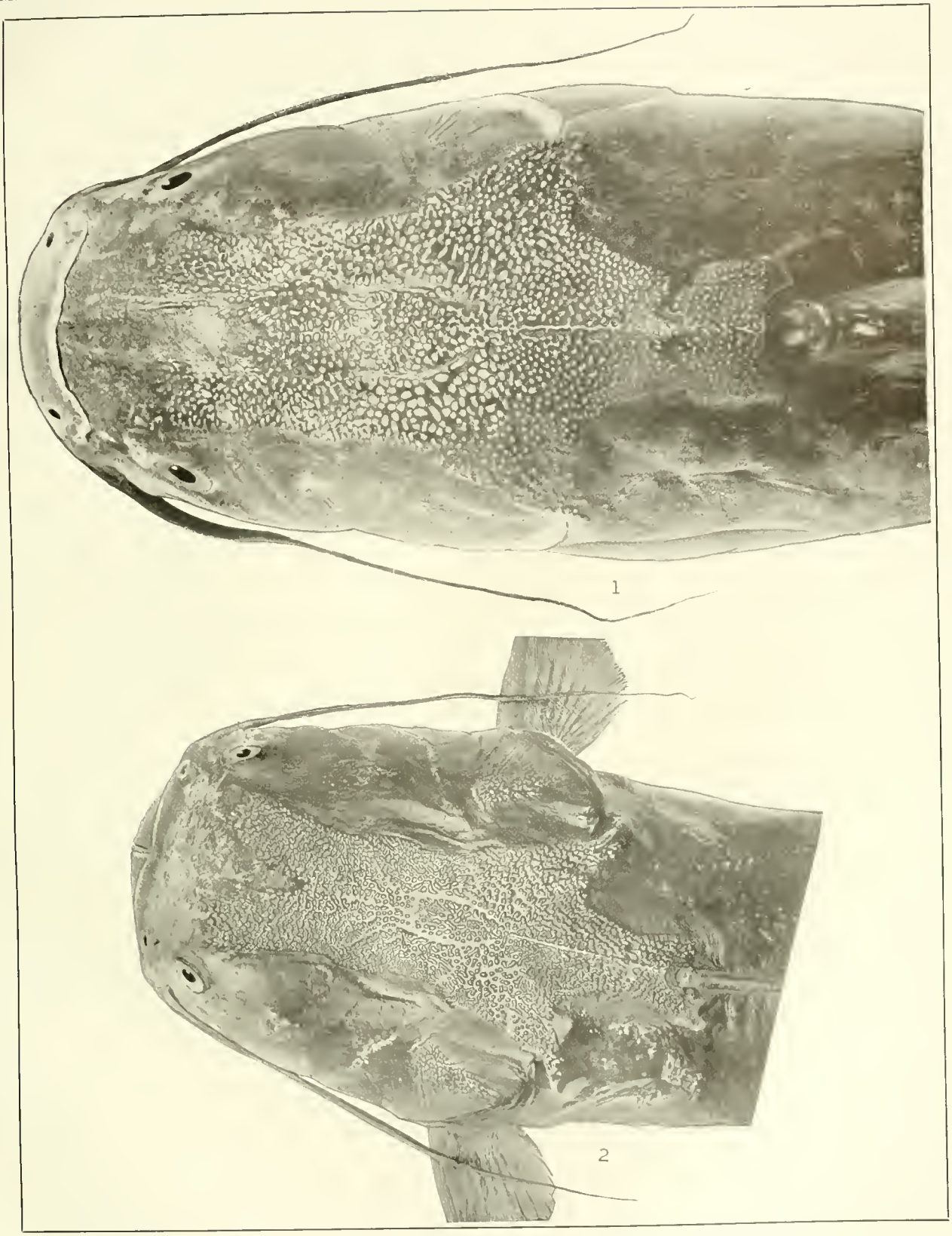


1–3. *Agmus scabriceps* EIGENMANN and EIGENMANN. (Type.) 42 mm. (Mus. Comp. Zool. Cambridge.)

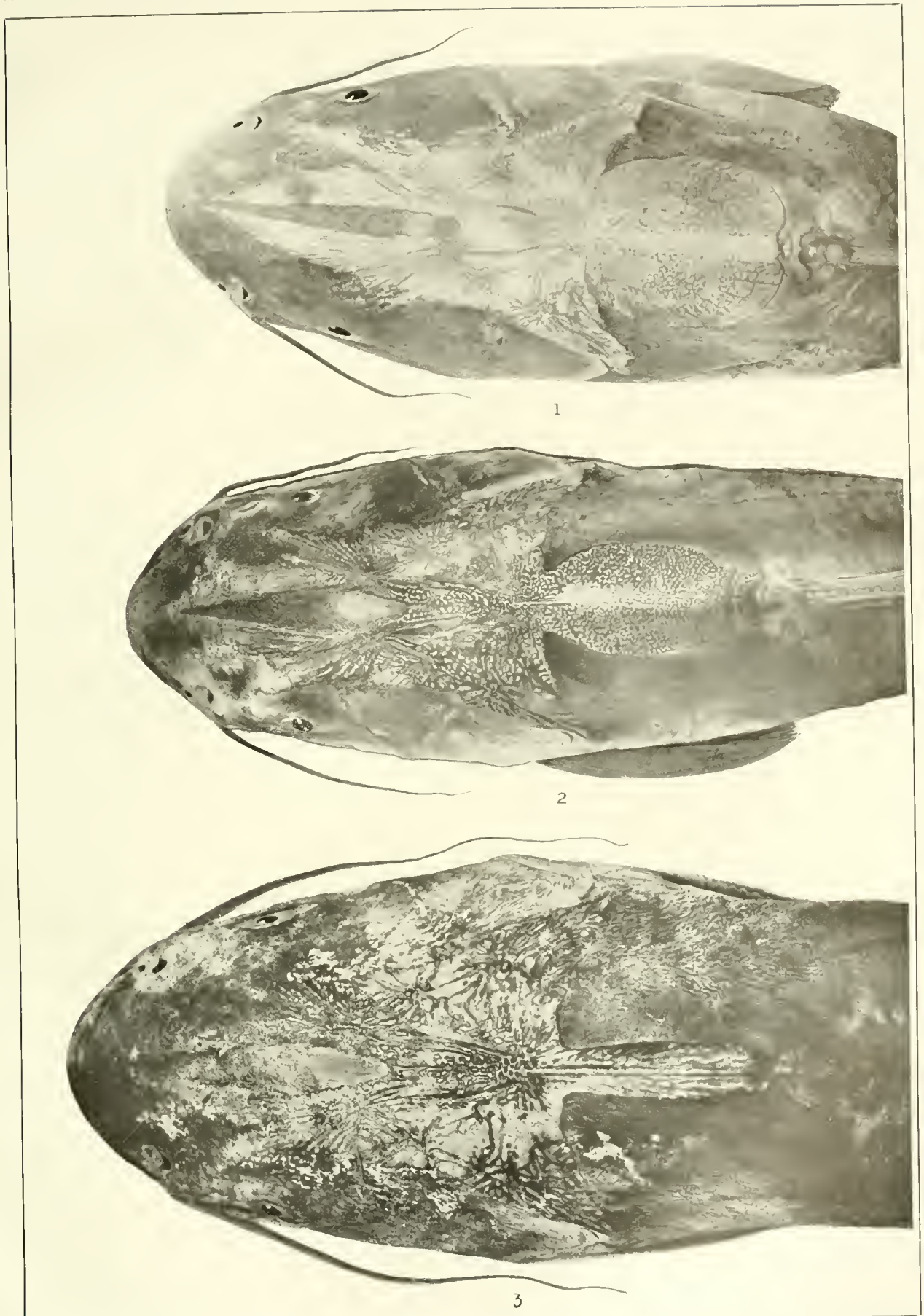


1. *Sciadeichthys flavescens* (CUVIER and VALENCIENNES). 305 mm. to dorsal. No. 1265. 2. *Sciadeichthys proöps* (CUVIER and VALENCIENNES). 190 mm. to dorsal. No. 1263. 3. *Sciadeichthys parkeri* (TRAILL). 130 mm. to dorsal. No. 1278.

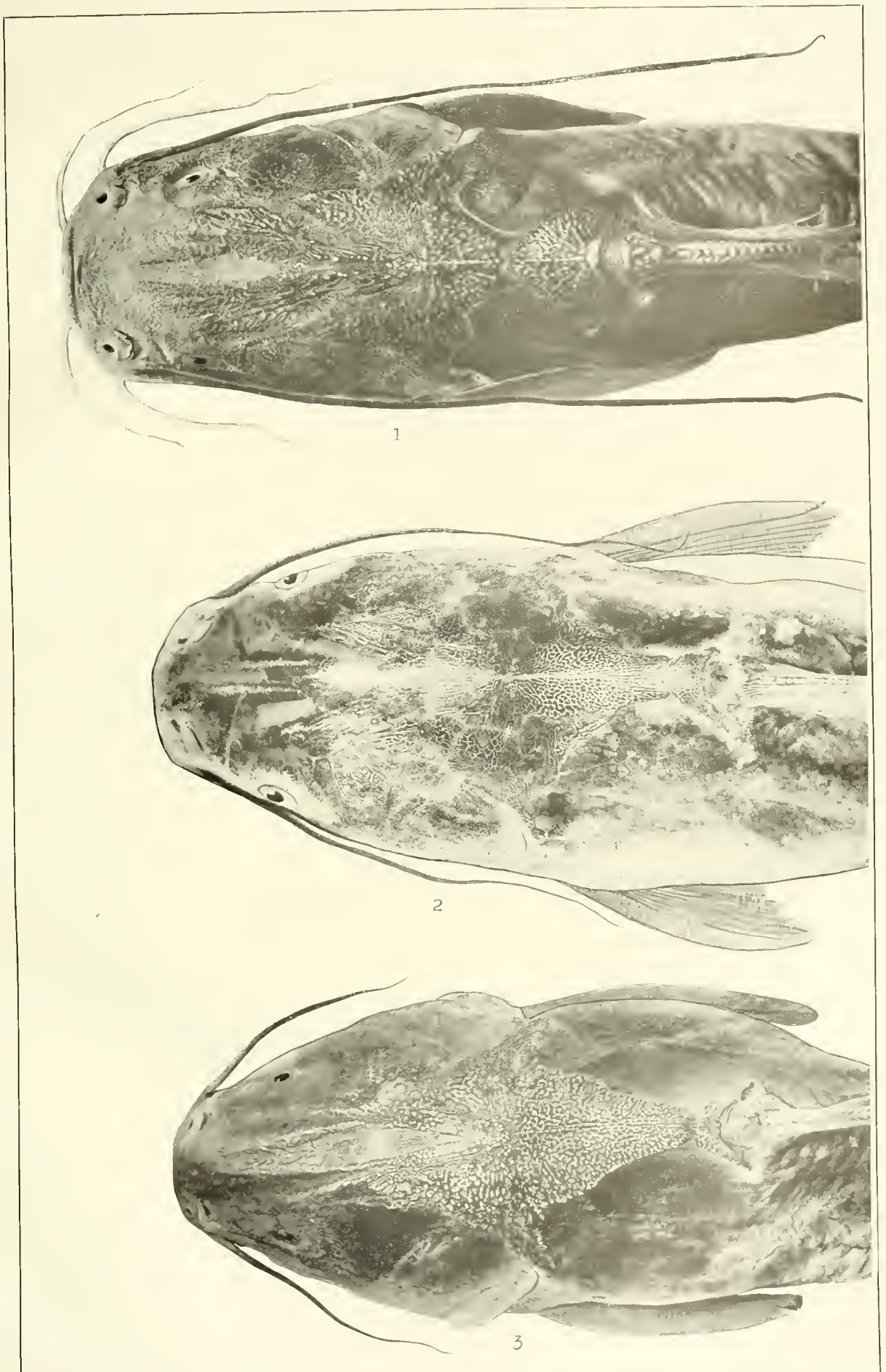
Sciadeichthys proops (CUVIER and VALENCIENNES). 1. Dorsal view (the so-called monk). 2. Palatal view (the so-called crucifix). 3. Lateral view.



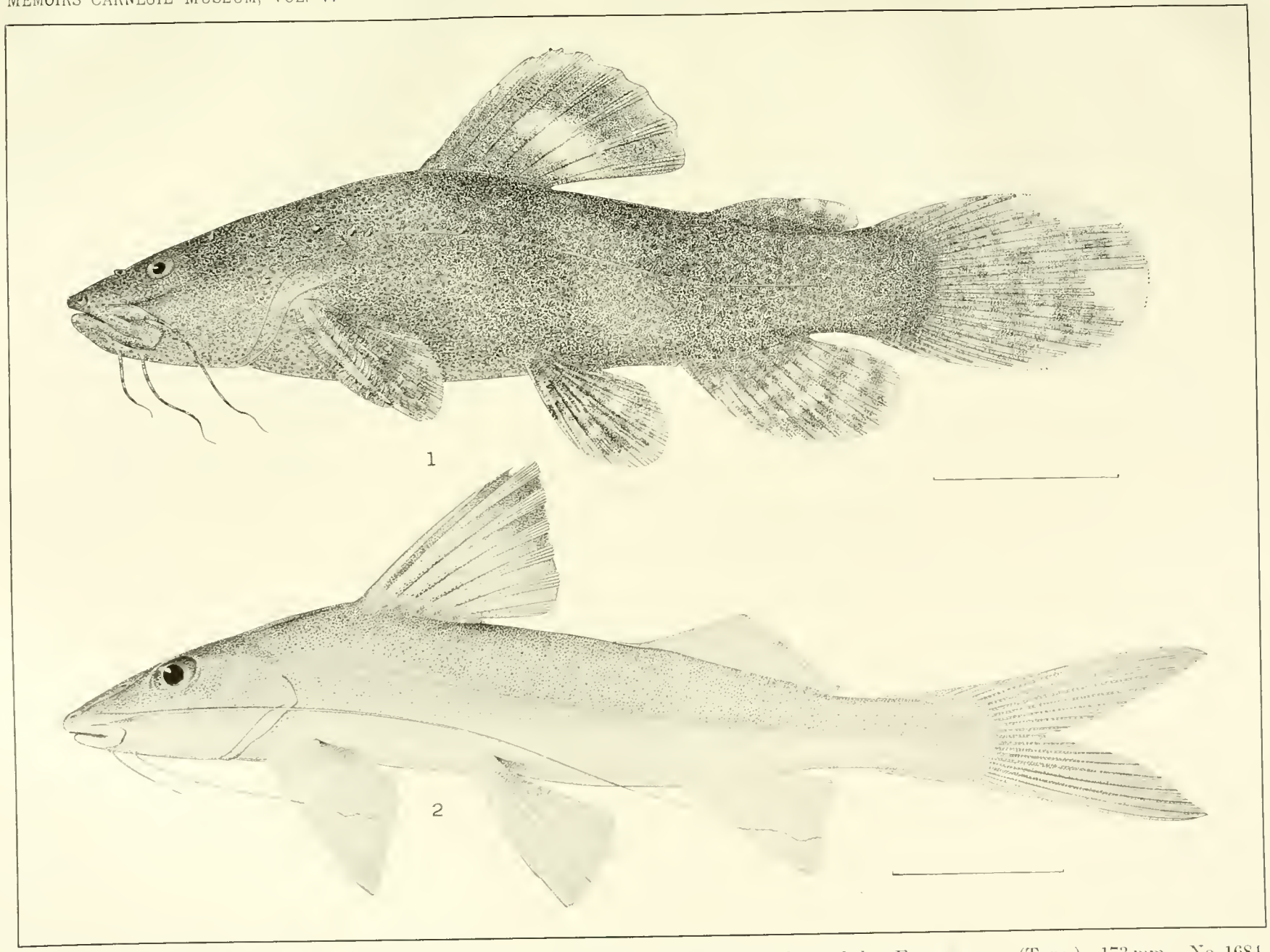
1. *Selenaspis herzbergi* (BLOCH). 107 mm. to dorsal. No. 1266. 2. *Selenaspis passany* (CUVIER and VALENCIENNES). 543 mm. total length. (Berlin Museum, Coll. Schomburgk.)



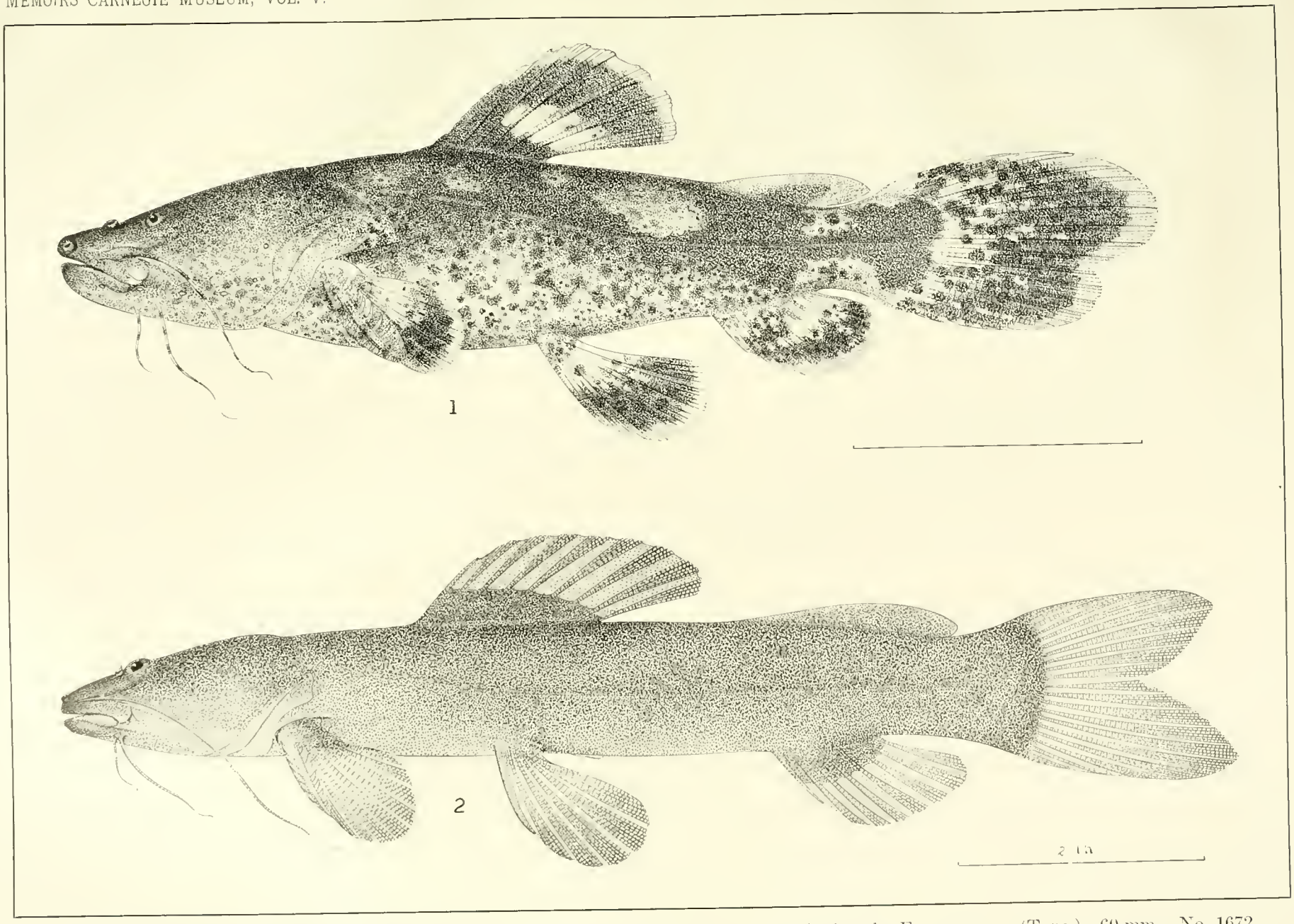
1. *Notarius grandicassis* (CUVIER and VALENCIENNES). 161 mm. to dorsal. No. 1258. 2. *Notarius parmocassis* (CUVIER and VALENCIENNES). 147 mm. to dorsal. No. 1252. 3. *Notarius stricticassis* (CUVIER and VALENCIENNES). 139 mm. to dorsal. No. 1261.



1. *Sciadeichthys emphysetus* (MÜLLER and TROSCHEL). 91 mm. to dorsal. No. 1735. 2. *Arius spixi* (AGASSIZ). 66 mm. to dorsal. No. 1287. 3. *Hexanematichthys rugispinis* (CUVIER and VALENCIENNES). 134 mm. to dorsal. No. 1284.

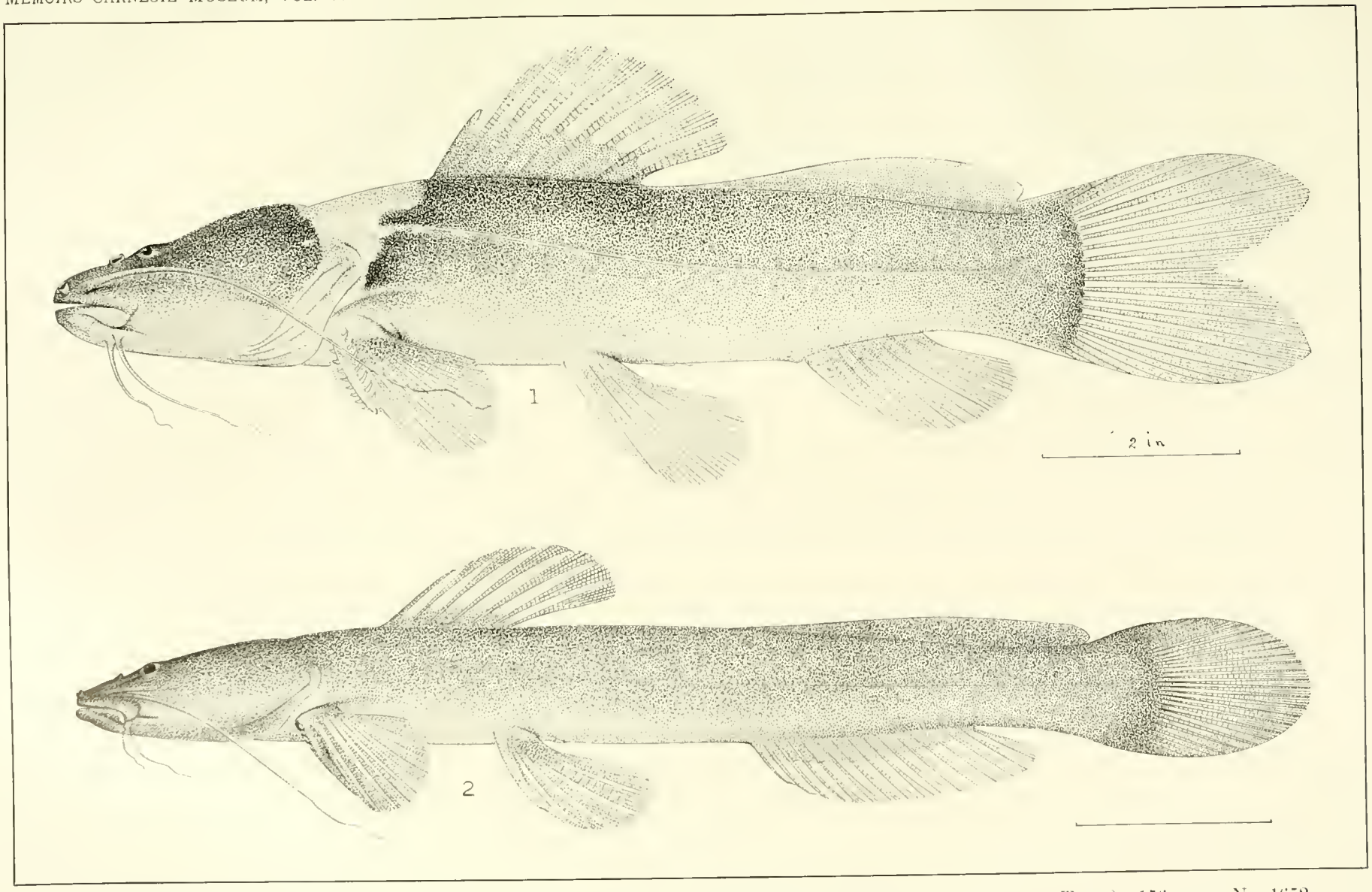


1. *Pseudopimelodus villosus* EIGENMANN. (Type.) 148 mm. No. 1677. 2. *Megalonema platycephalum* EIGENMANN. (Type.) 173 mm. No. 1684.

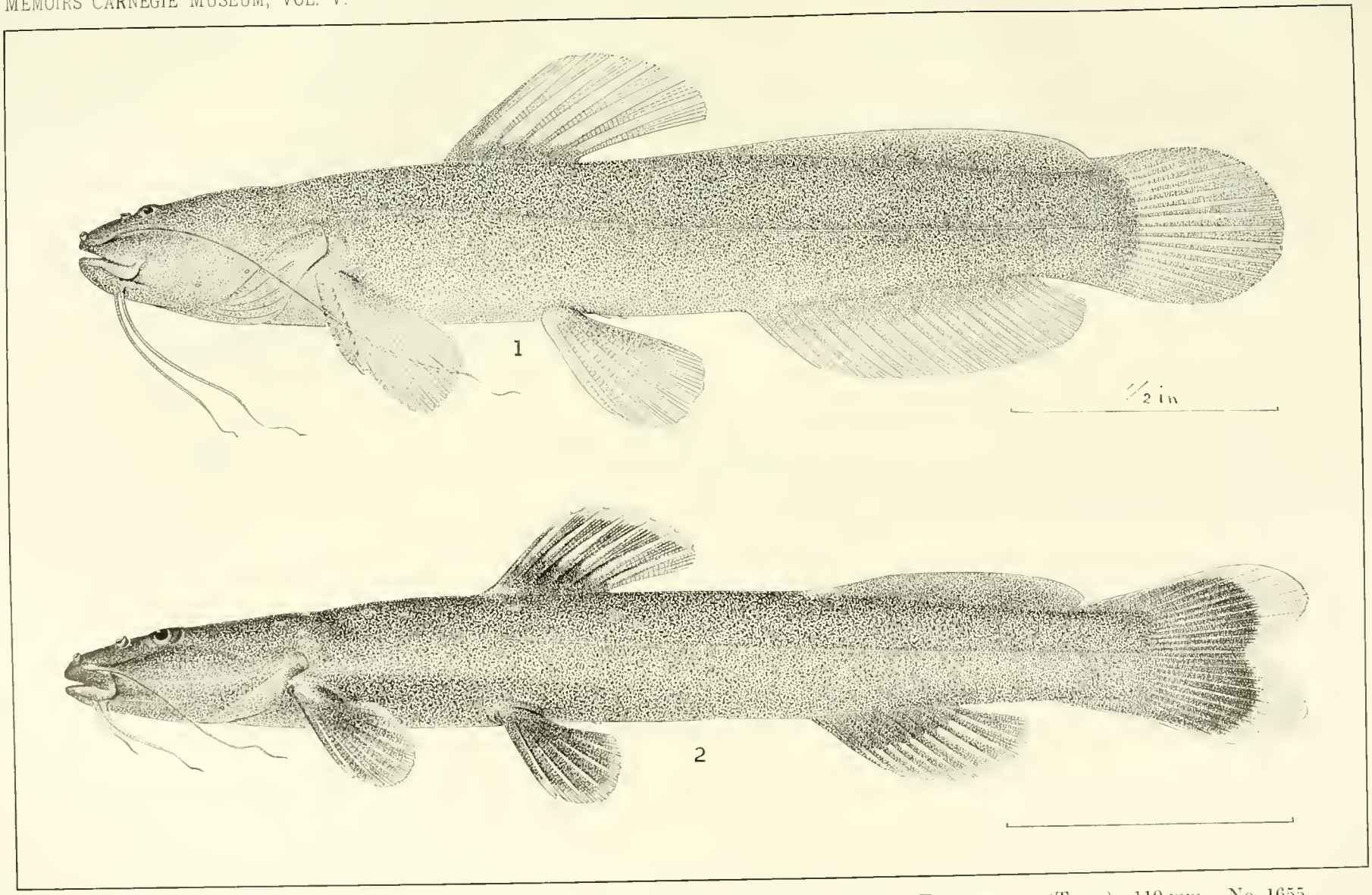


1. *Pseudopimelodus albomarginatus* EIGENMANN. (Type.) 98 mm. No. 1680. 2. *Brachyglanis melas* EIGENMANN. (Type.) 60 mm. No. 1672.

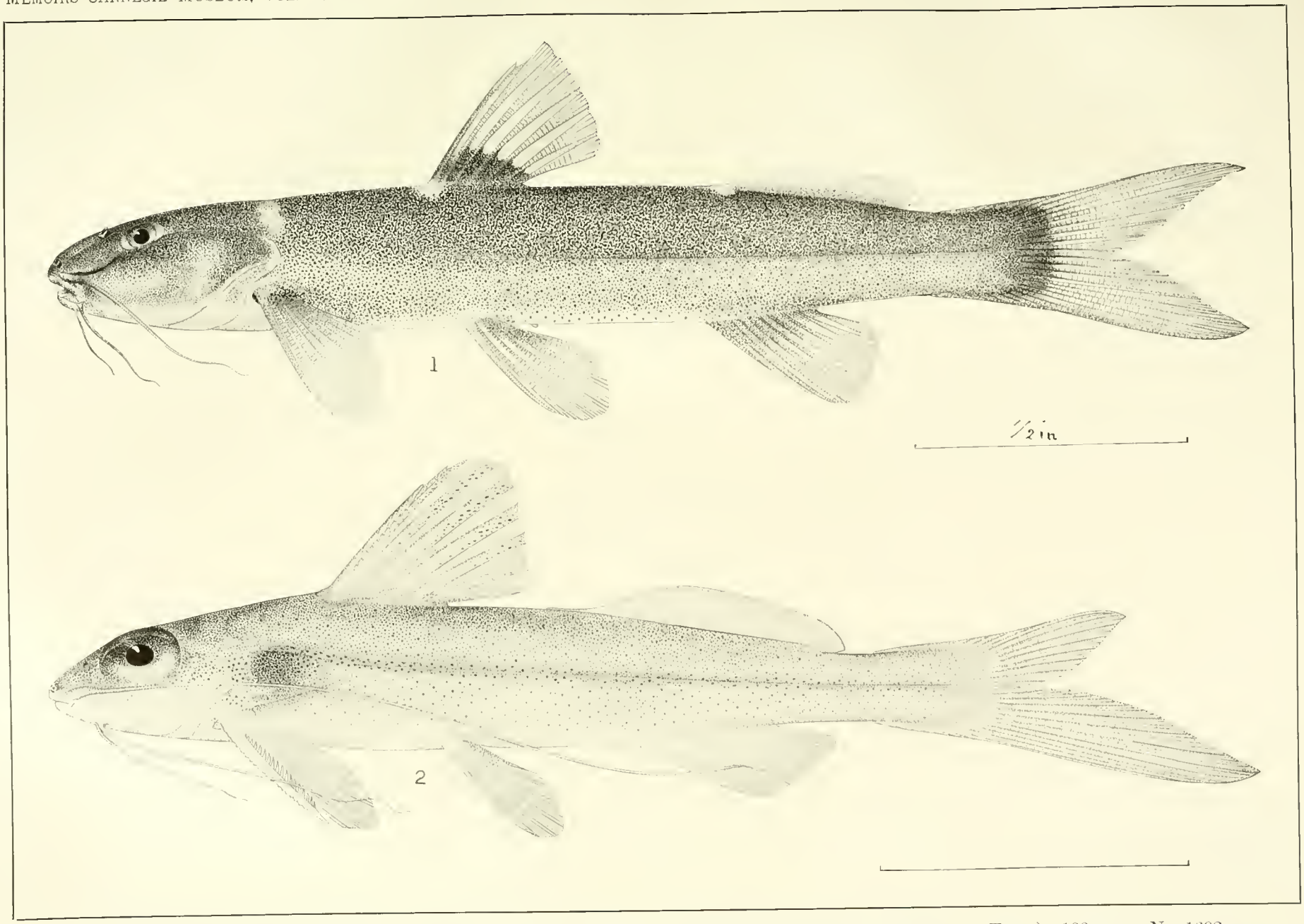
1. *Brachyglanis phalacra* EIGENMANN. (Type.) 25 mm. to dorsal. No. 1671. 2. *Microglanis pœcilus* EIGENMANN. (Type.) 37 mm. No. 1676.



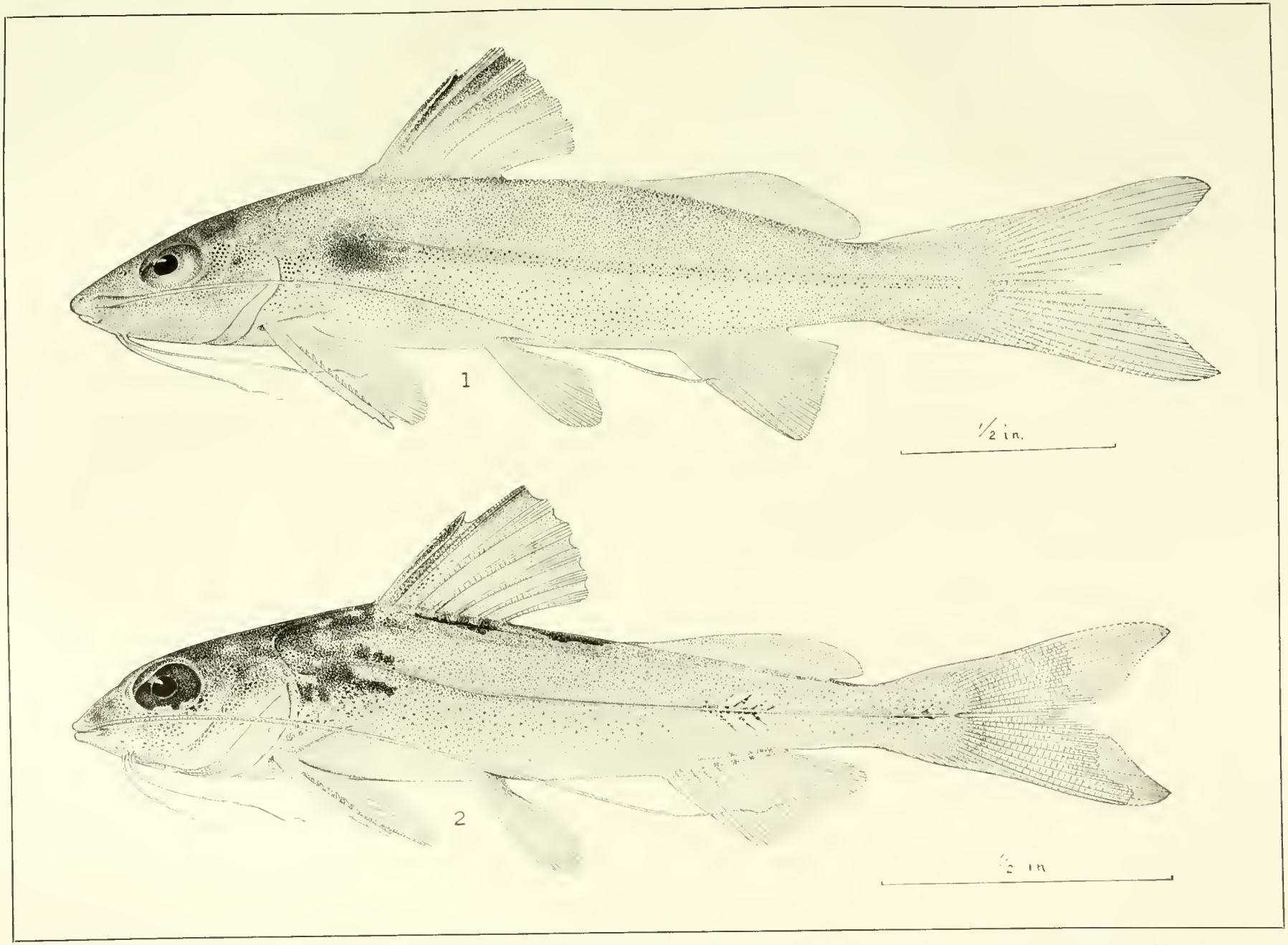
1. *Brachyglanis phalacra* EIGENMANN. (Type.) 81 mm. No. 1671. 2. *Leptoglanis essequibensis* EIGENMANN. (Type.) 156 mm. No. 1652.



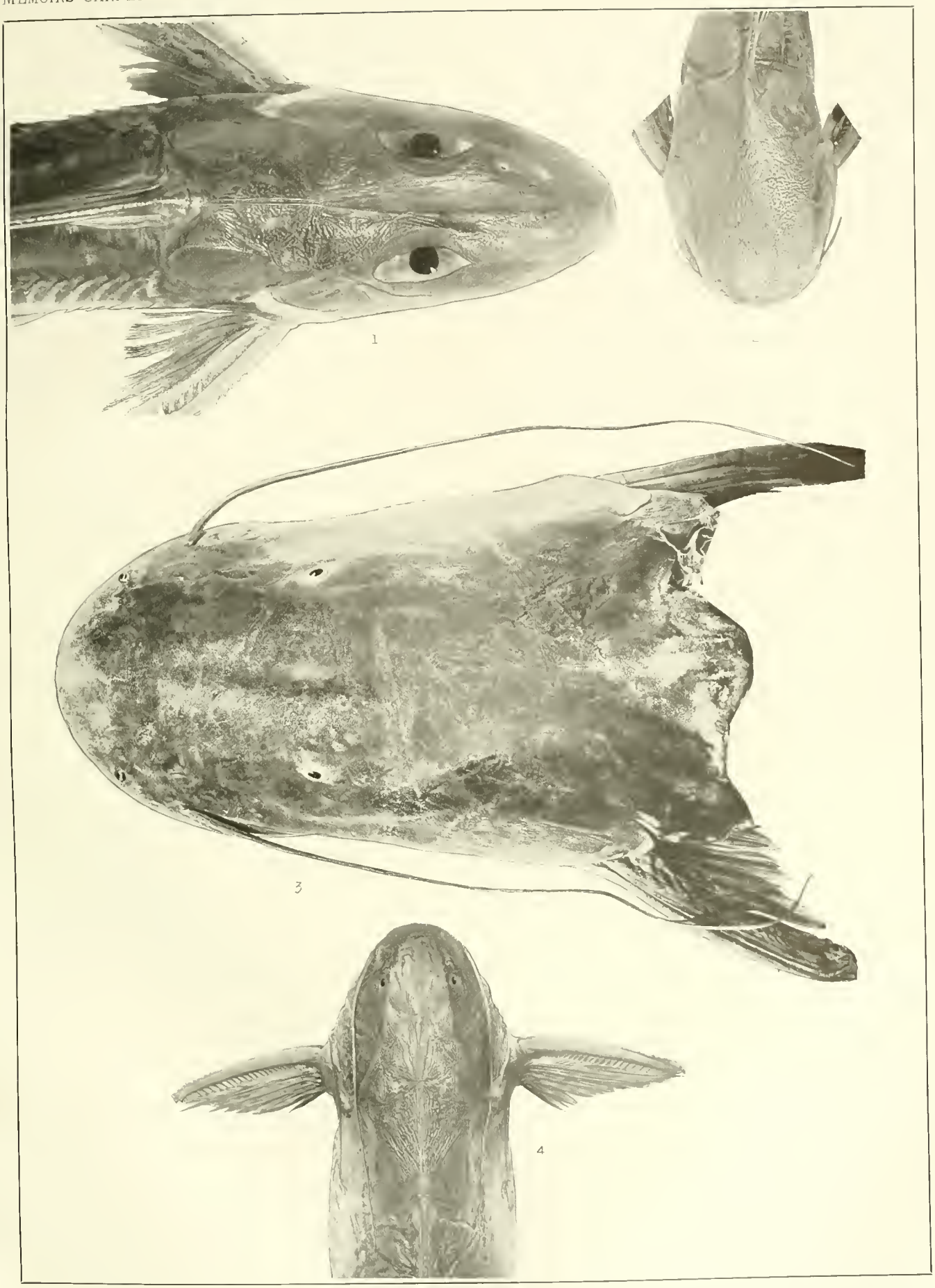
1. *Myoglanis potaroënsis* EIGENMANN. (Type.) 58 mm. No. 1664. 2. *Chasmocranus longior* EIGENMANN. (Type.) 110 mm. No. 1655.



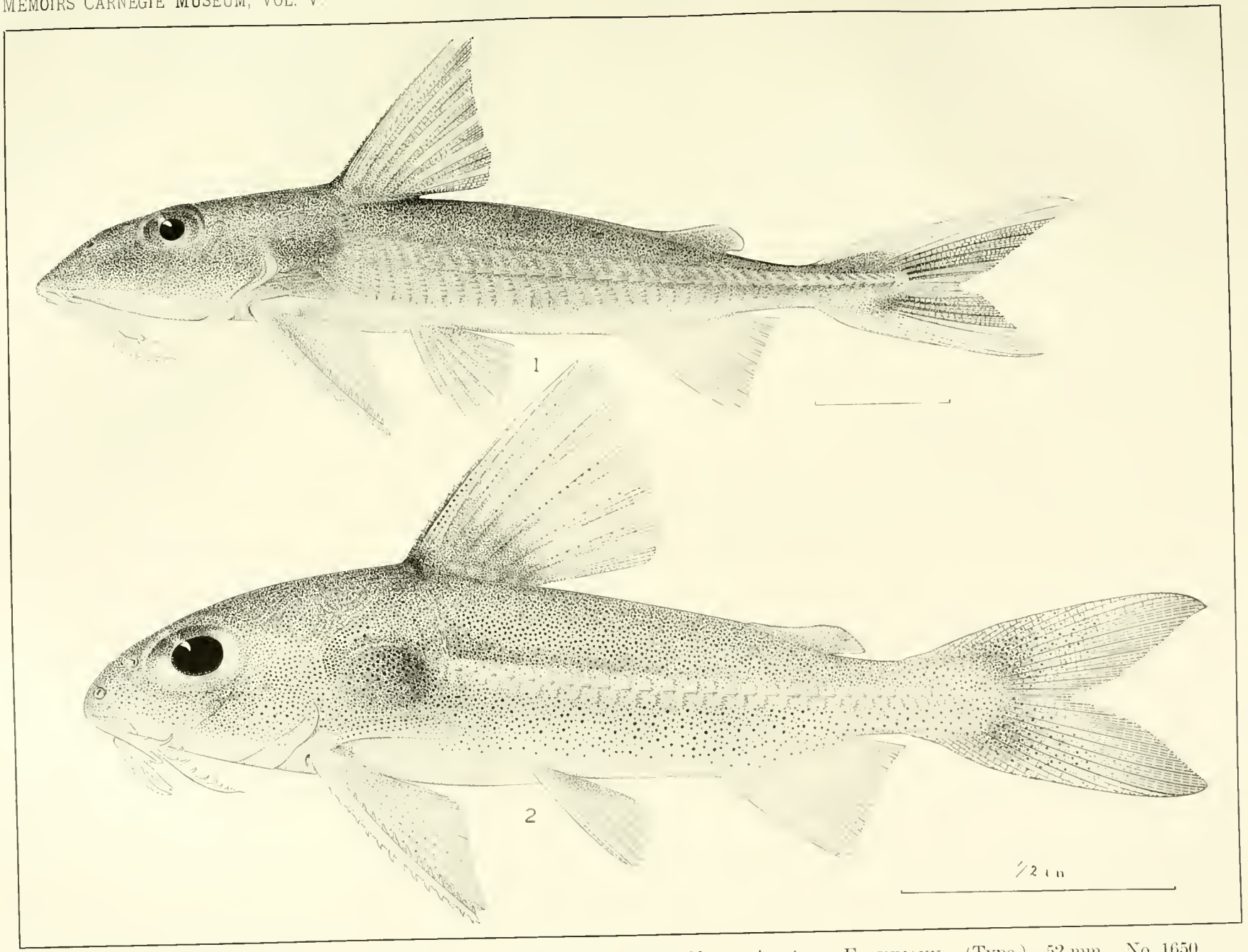
1. *Chasmocranus brevior* EIGENMANN. (Type.) 56 mm. No. 1662. 2. *Pimelodella megalops* EIGENMANN. (Type.) 100 mm. No. 1692.



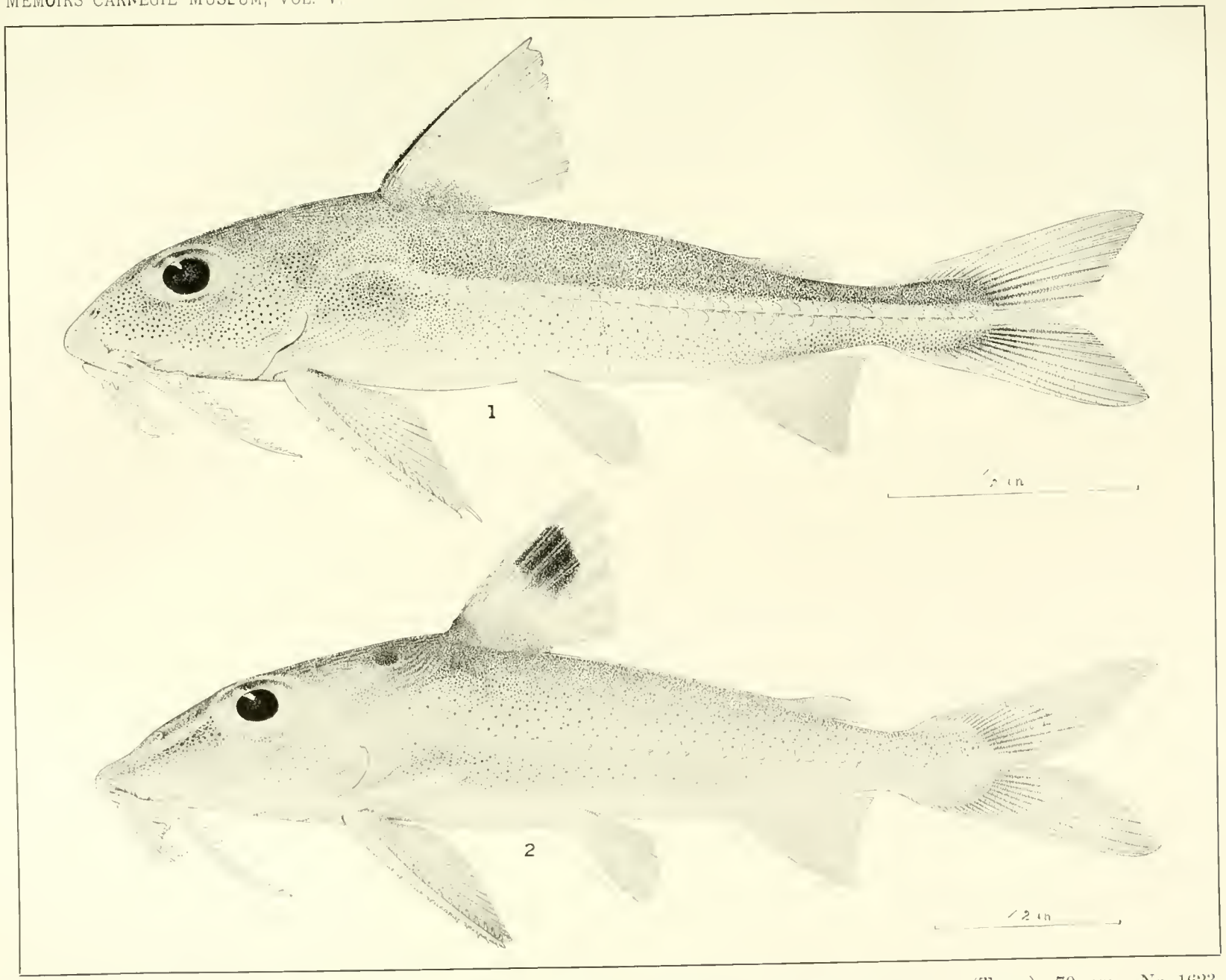
1. *Pimelodella macturki* EIGENMANN. (Type.) 69 mm. No. 1695. 2. *Pimelodus heteropleurus* EIGENMANN. (Type.) 46 mm. No. 1734.



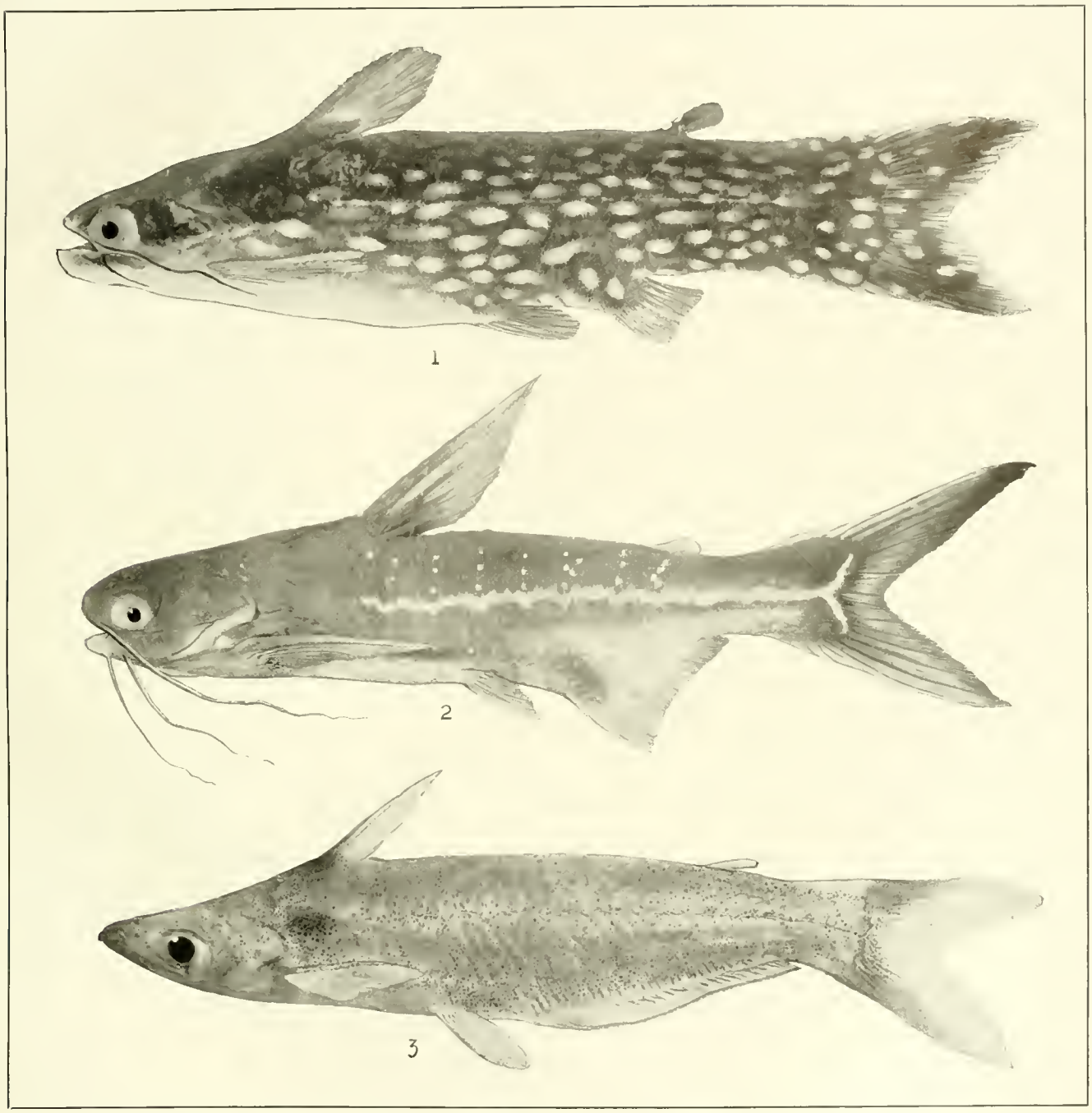
1. *Leptodoras linnelli* EIGENMANN. (Type.) 52 mm. to dorsal. No. 1626. 2. *Trachycorystes obscurus* (GÜNTHER). (Type.) In British Museum. 3. *Brachyplatystoma vaillanti* (CUVIER and VALENCIENNES). 80 mm. between eyes. No. 1288. 4. *Doras granulosus* VALENCIENNES. Total length, 395 mm. Berlin Museum. Coll. Schomburgk.



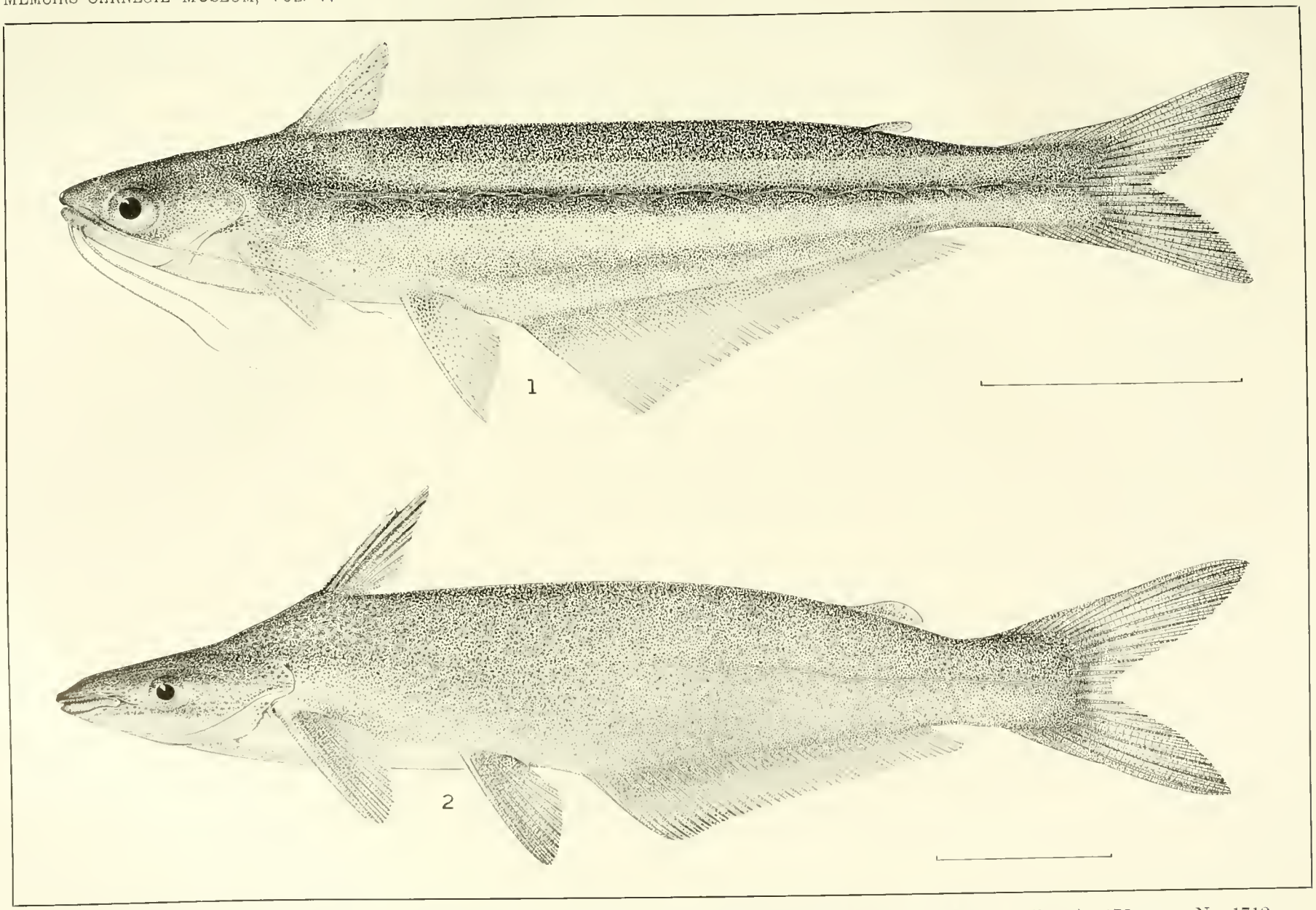
1. *Leptodoras linnelli* EIGENMANN. (Type.) 190 mm. No. 1626. 2. *Hemidoras microstomus* EIGENMANN. (Type.) 52 mm. No. 1650.



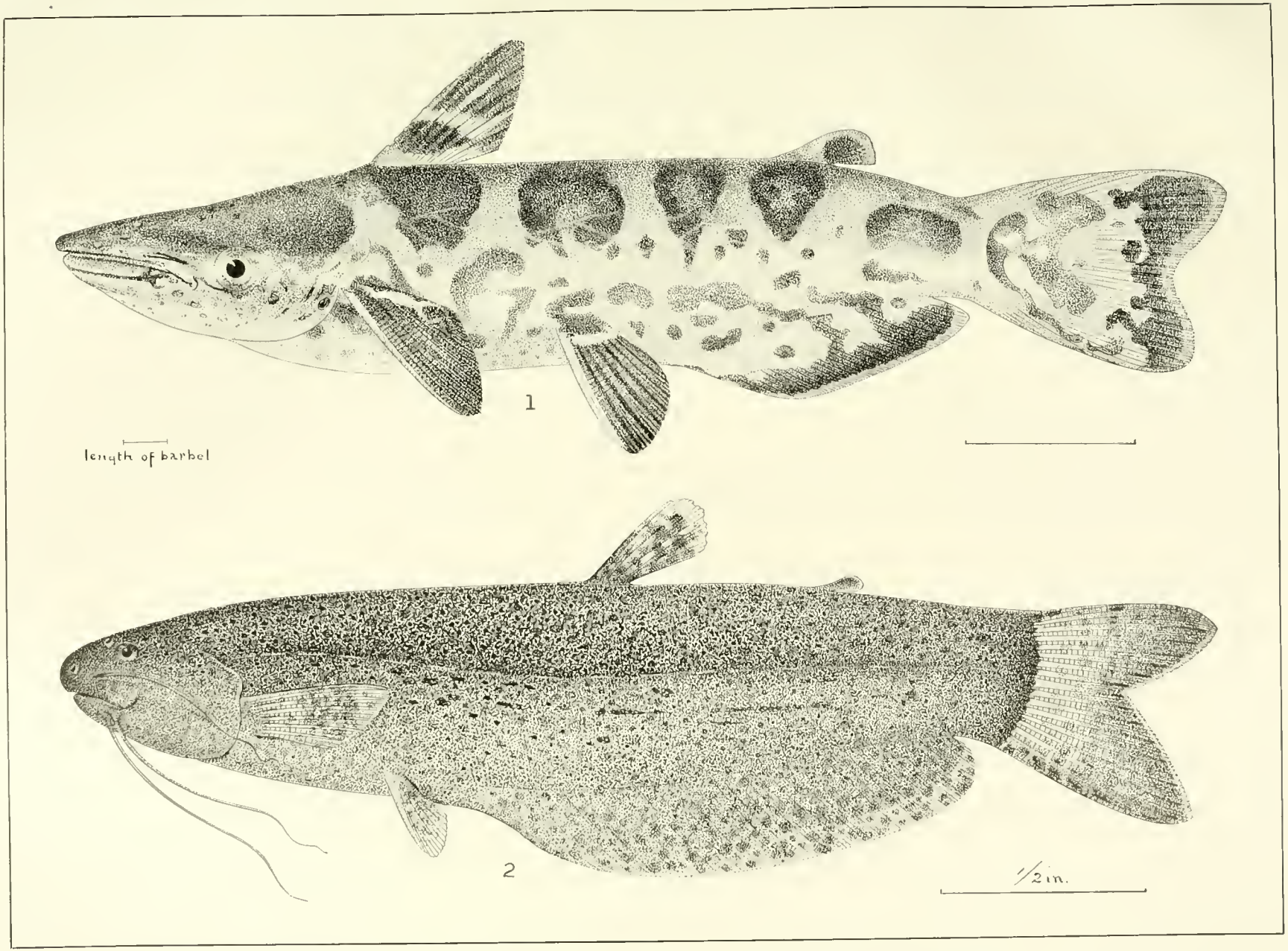
1. *Hemidoras leporhinus* EIGENMANN. (Type.) 56 mm. No. 1624. 2. *Hemidoras notospilus* EIGENMANN. (Type.) 70 mm. No. 1623.



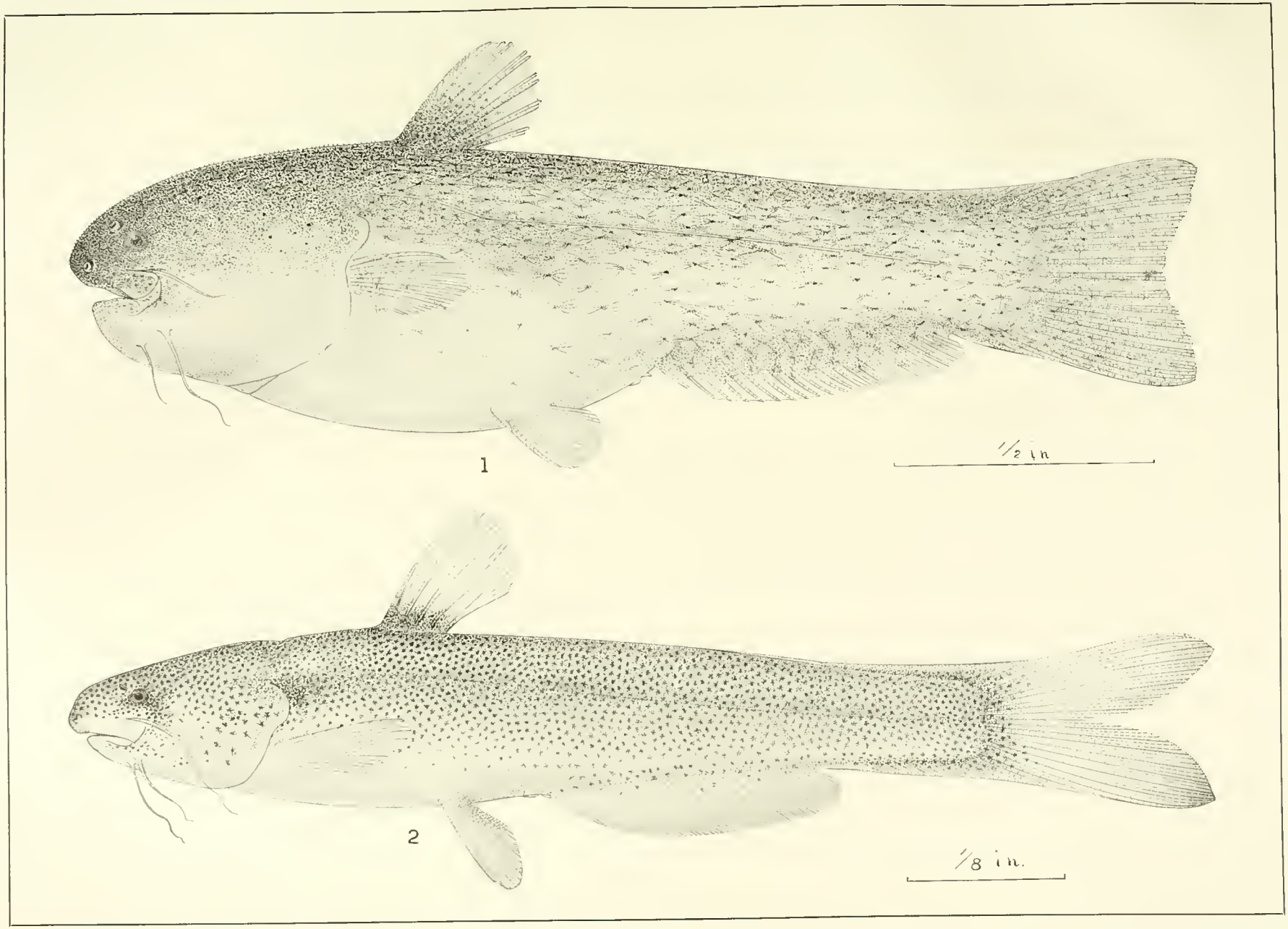
1. *Centromochlus analopygius* KNER. 65 mm. No. 1727. 2. *Pseudauchenipterus nodosus* (BLOCH). 212 mm. No. 1725. 3. *Tympanopleura piperata* EIGENMANN. (Type.) 64 mm. No. 1708.



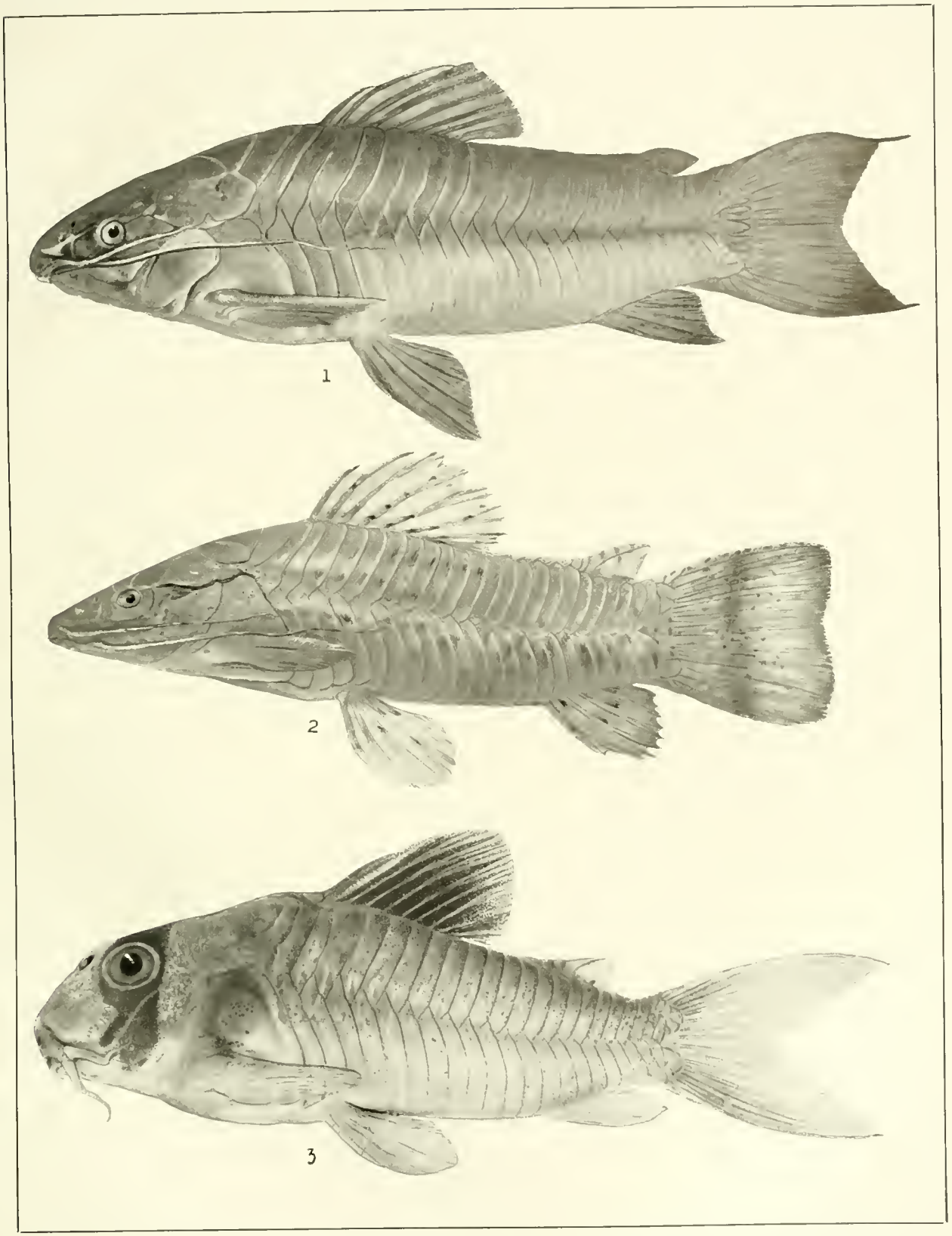
1. *Auchenipterus demeraræ* EIGENMANN. (Type.) 115 mm. No. 1714. 2. *Ageneiosus guianensis* EIGENMANN. (Type.) 175 mm. No. 1712.



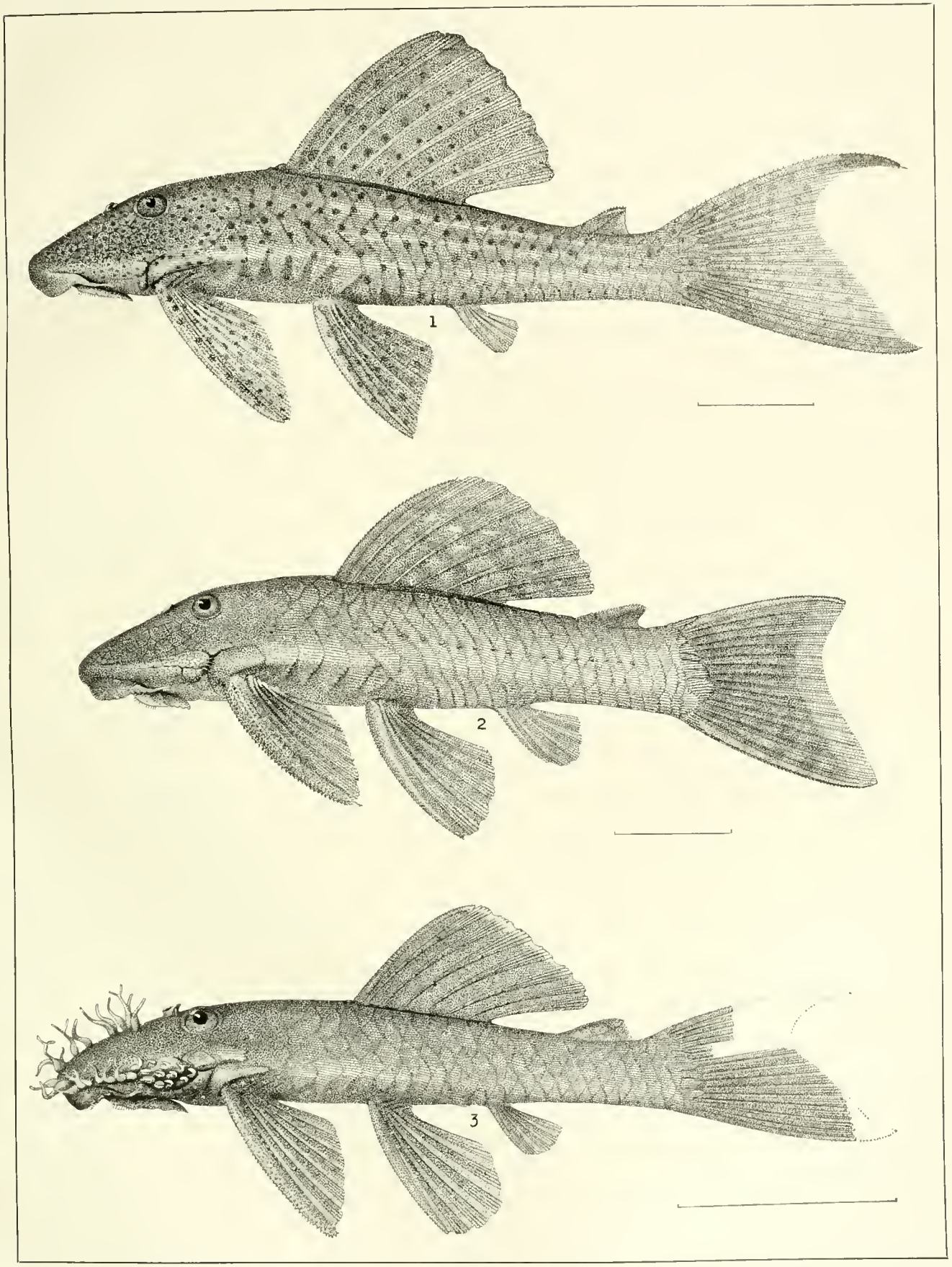
1. *Ageneiosus marmoratus* EIGENMANN. (Type.) 175 mm. No. 1710. 2. *Helogenes marmoratus* GÜNTHER. 73 mm. No. 1703.



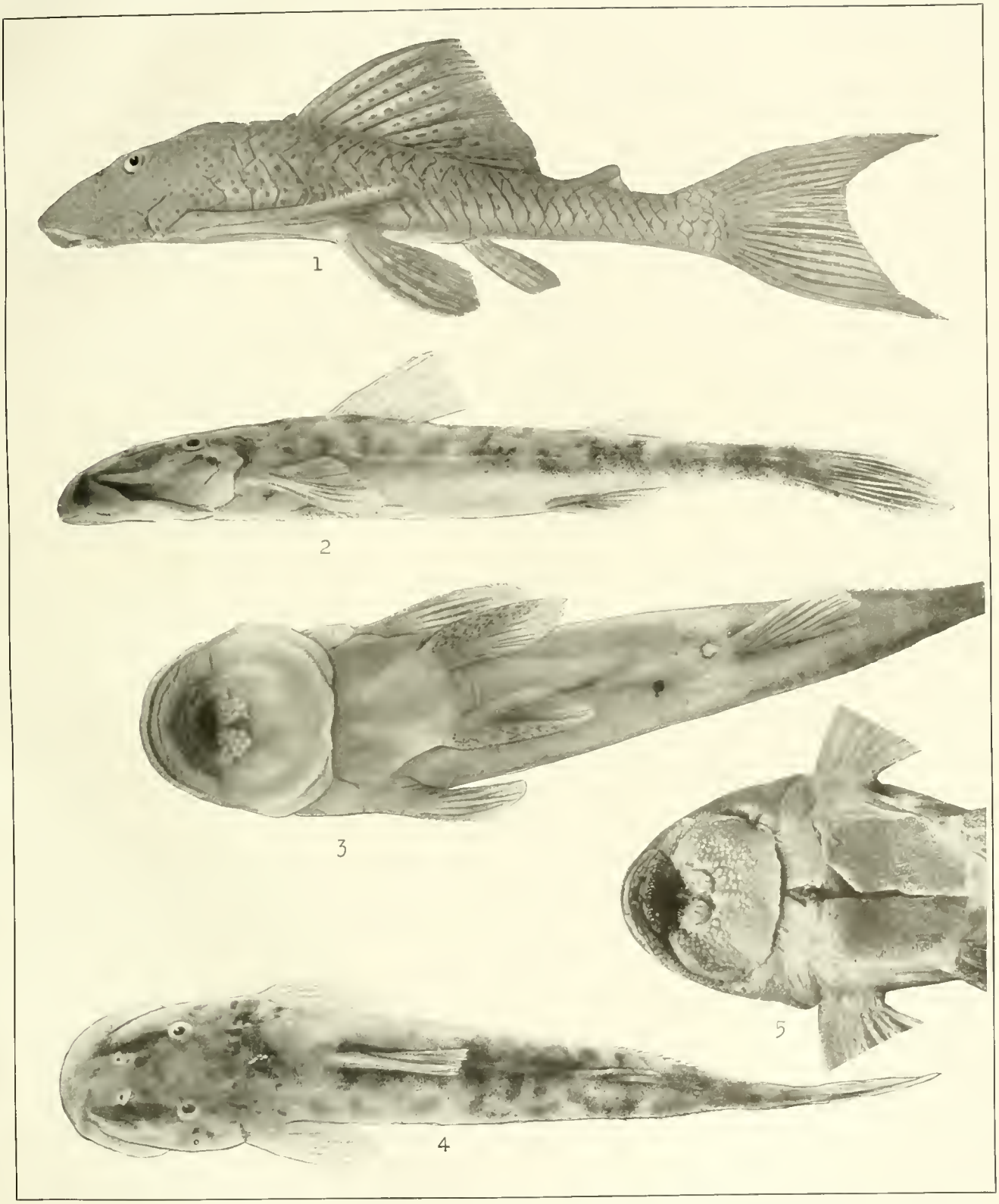
1. *Hemicetopsis macilentus* EIGENMANN. (Type.) 55 mm. No. 1726. 2. *Hemicetopsis minutus* EIGENMANN. (Type.) 22 mm. No. 1728.



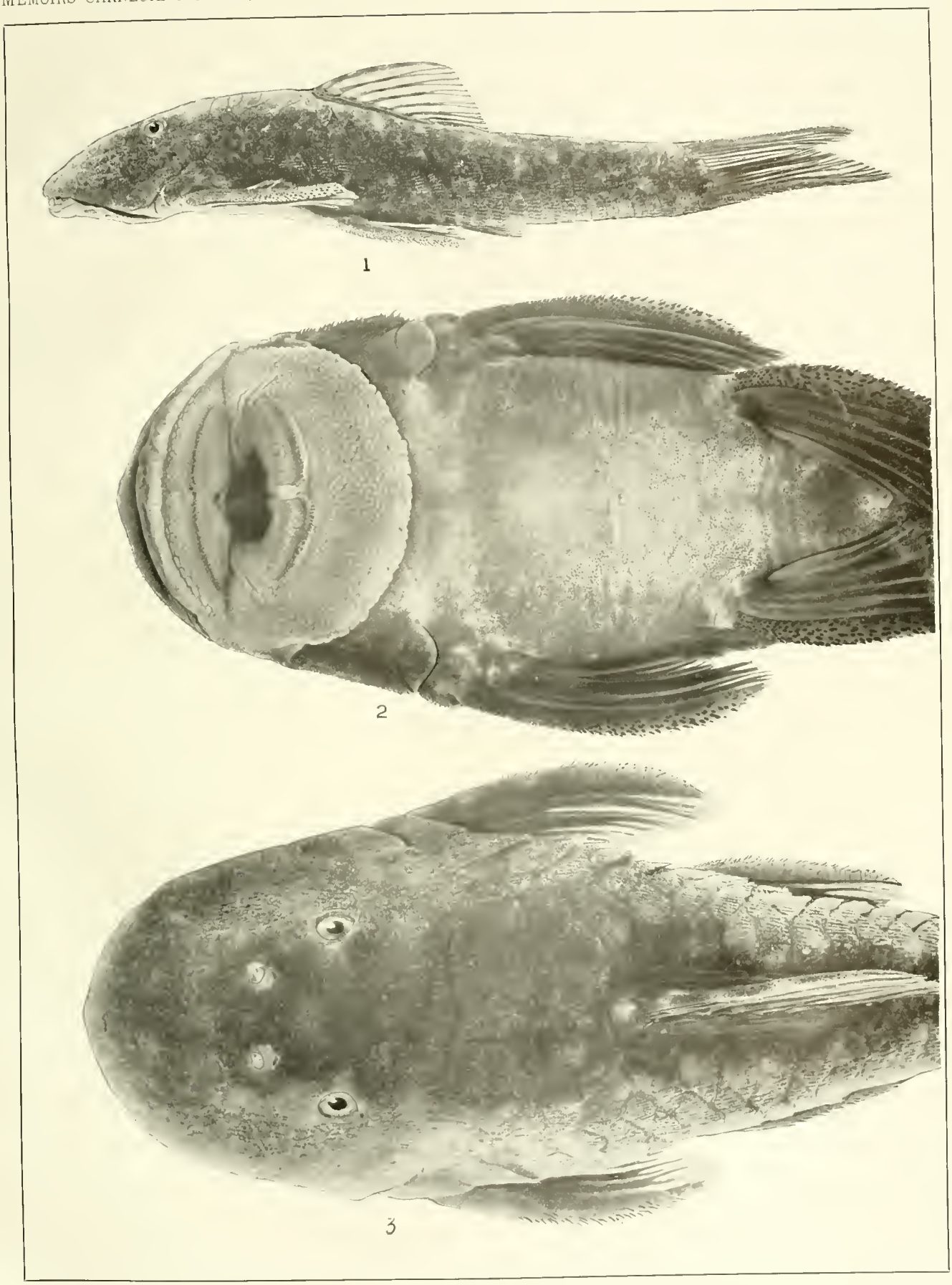
1. *Hoplosternum littorale* (HANCOCK). 192 mm. No. 1575. 2. *Hoplosternum thoracatum* (CUVIER and VALENCIENNES). 110 mm. No. 1579. 3. *Corydoras punctatus* (BLOCH). 51 mm. No. 1561.



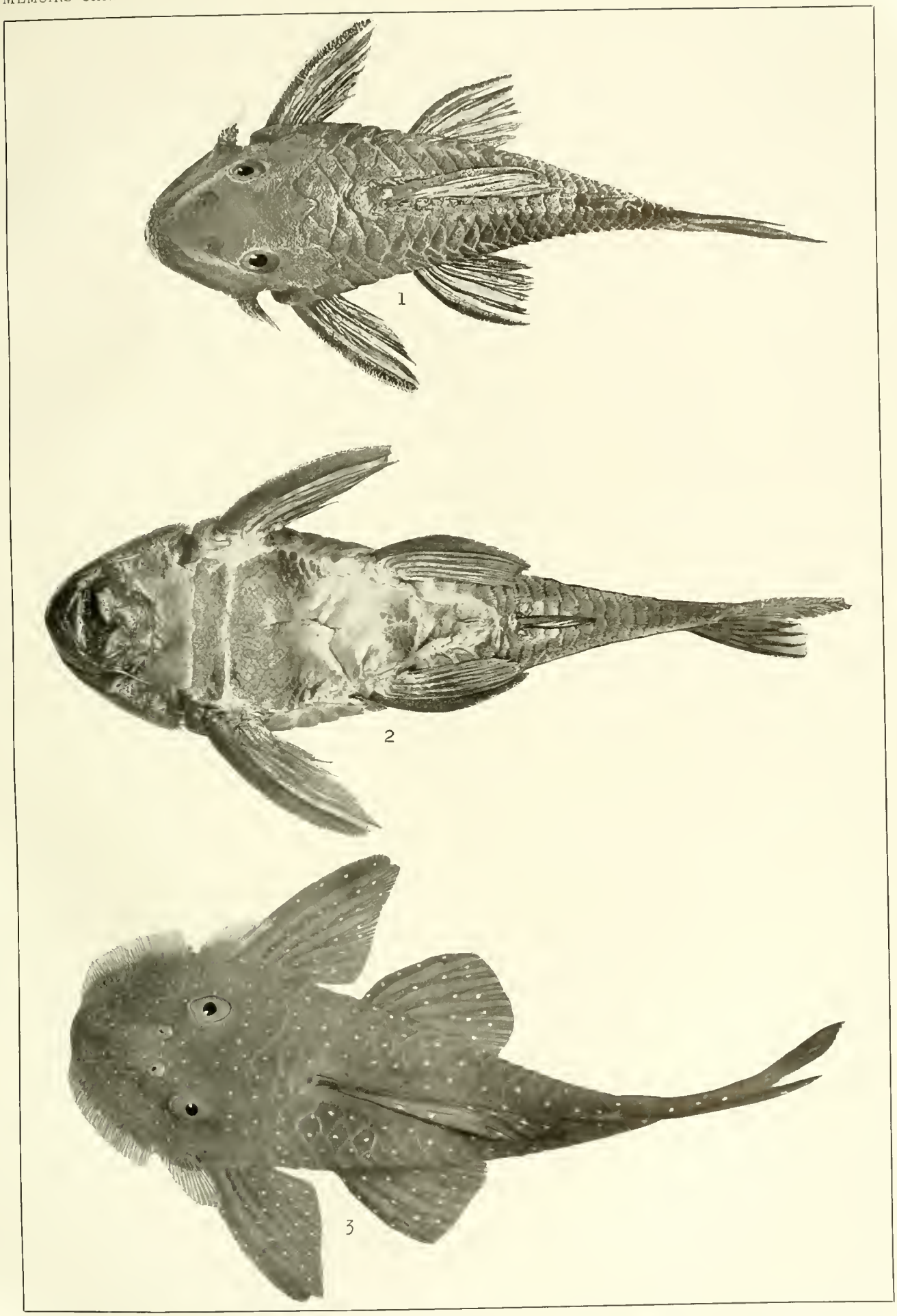
1. *Plecostomus hemiurus* EIGENMANN. (Type.) 201 mm. No. 1544. 2. *Pseudancistrus nigrescens* EIGENMANN. (Type.) 182 mm. No. 1539. 3. *Ancistrus lithurgicus* EIGENMANN. (Type.) 95 mm. No. 1524.



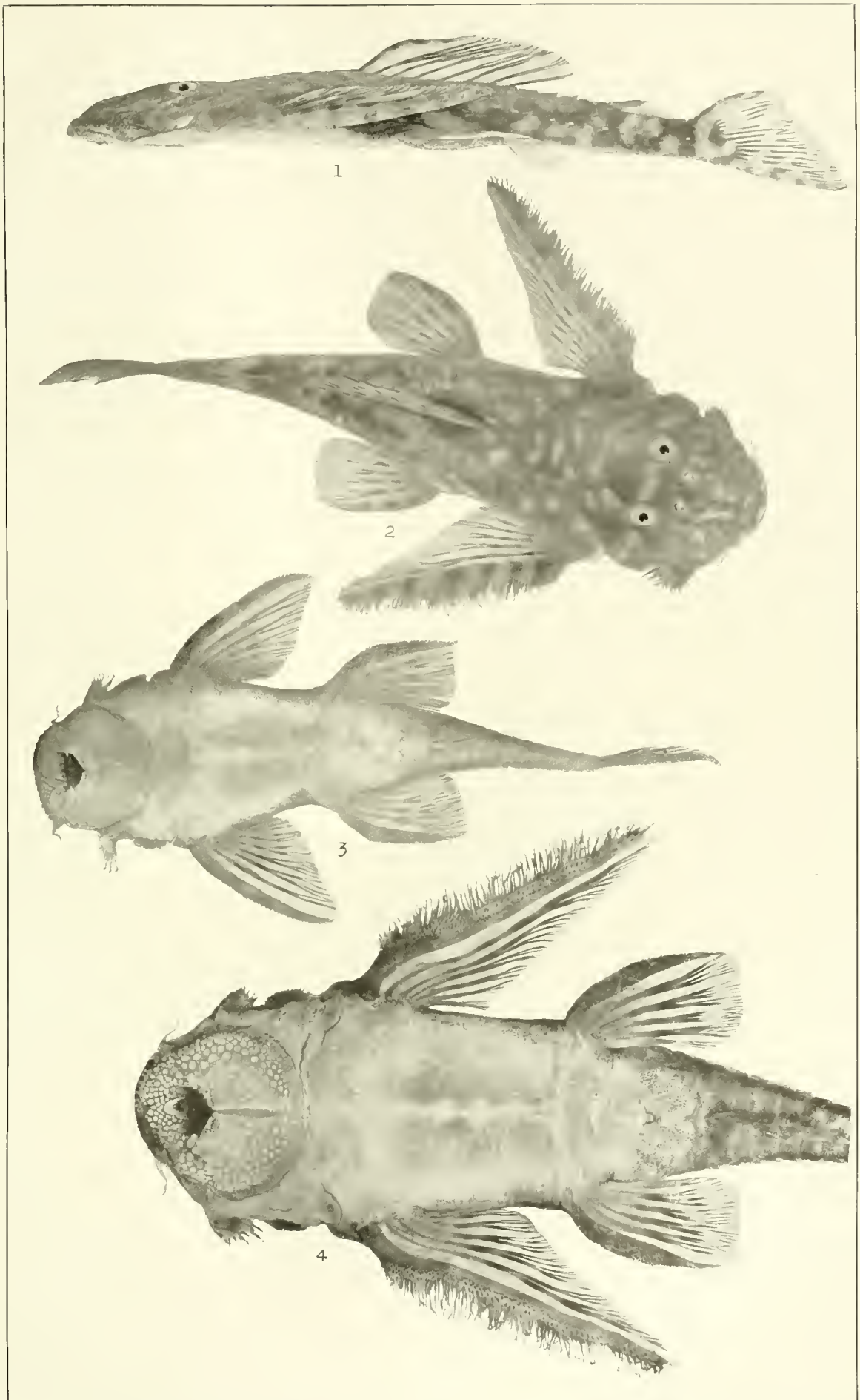
1. *Plecostomus watwata* (HANCOCK). 435 mm. No. 1540. 2–4. *Lithogenes villosus* EIGENMANN. (Type.) 44 mm. No. 1002. 5. *Neoplecostomus granosus* (CUVIER and VALENCIENNES). In British Museum.



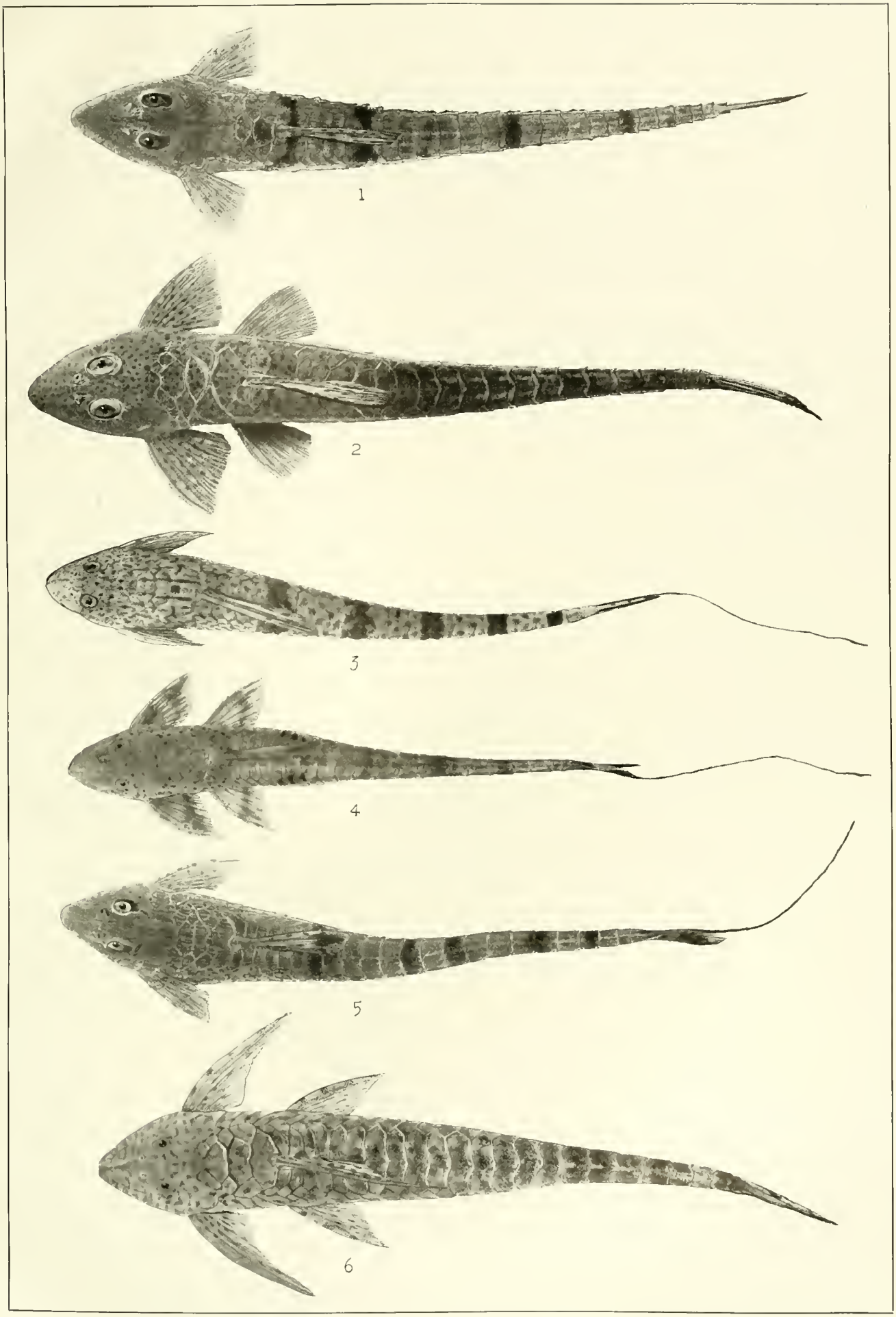
1-3. *Corymbophanes andersoni* EIGENMANN. (Type.) 86 mm. No. 1001.



1–2. *Hemiancistrus braueri* EIGENMANN. (Type.) 120 mm. In Berlin Museum. (Coll. Schomburgk.)
3. *Pseudancistrus barbatus* (CUVIER and VALENCIENNES). 140 mm. No. 1533.

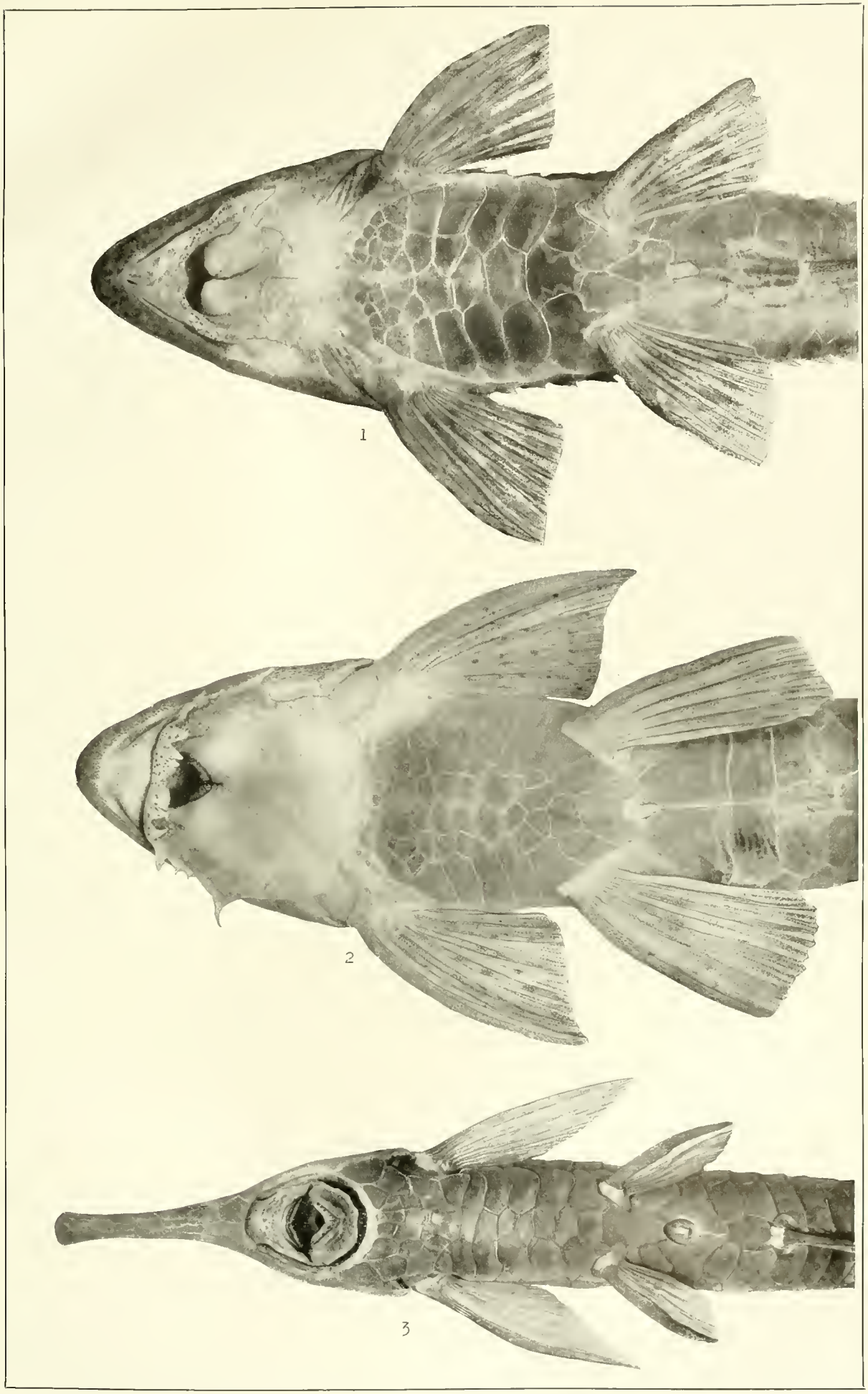


1–2. *Lithoxus lithoides* EIGENMANN, ♂. (Type.) 86 mm. No. 1527. 3. *Lithoxus lithoides* EIGENMANN, ♀. Ventral surface. 57 mm. No. 1528. 4. *Lithoxus lithoides* EIGENMANN, ♂. Ventral surface. (Type.) 86 mm. No. 1527. (Figure enlarged more than figs. 1 and 2.)

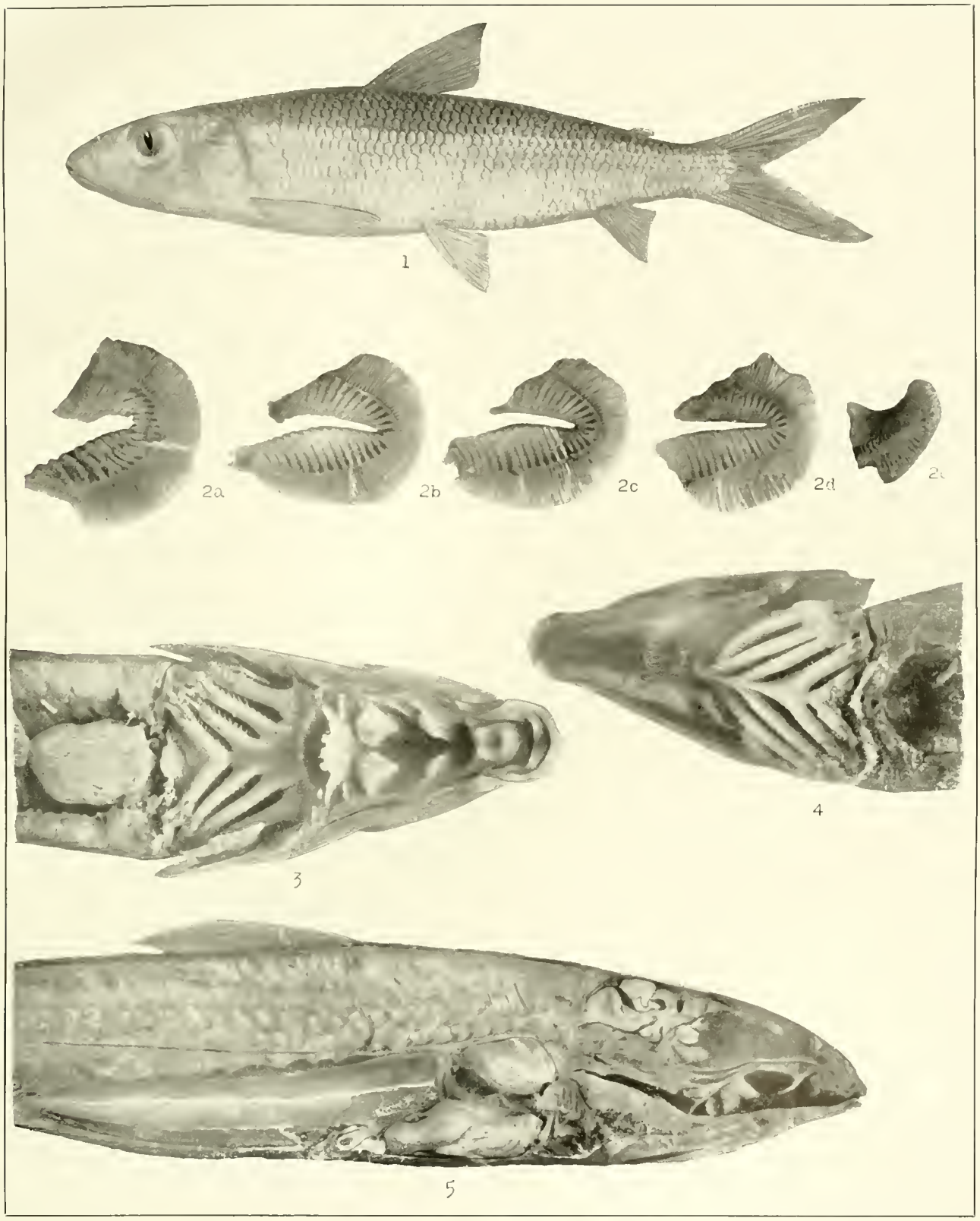


1. *Loricariichthys microdon* EIGENMANN. (Type.) 90 mm. No. 1507. 2. *Loricariichthys griseus* EIGENMANN. (Type.) 131 mm. No. 1504. 3. *Loricariichthys brunneus* (HANCOCK). 110 mm. No. 1499. 4. *Loricariichthys platyurus* (MÜLLER and TROSCHEL). 142 mm. No. 1510. 5. *Loricariichthys stewarti* EIGENMANN. (Type.) 81 mm. No. 1508. 6. *Harttia platystoma* (GÜNTHER). 160 mm. No. 1511.

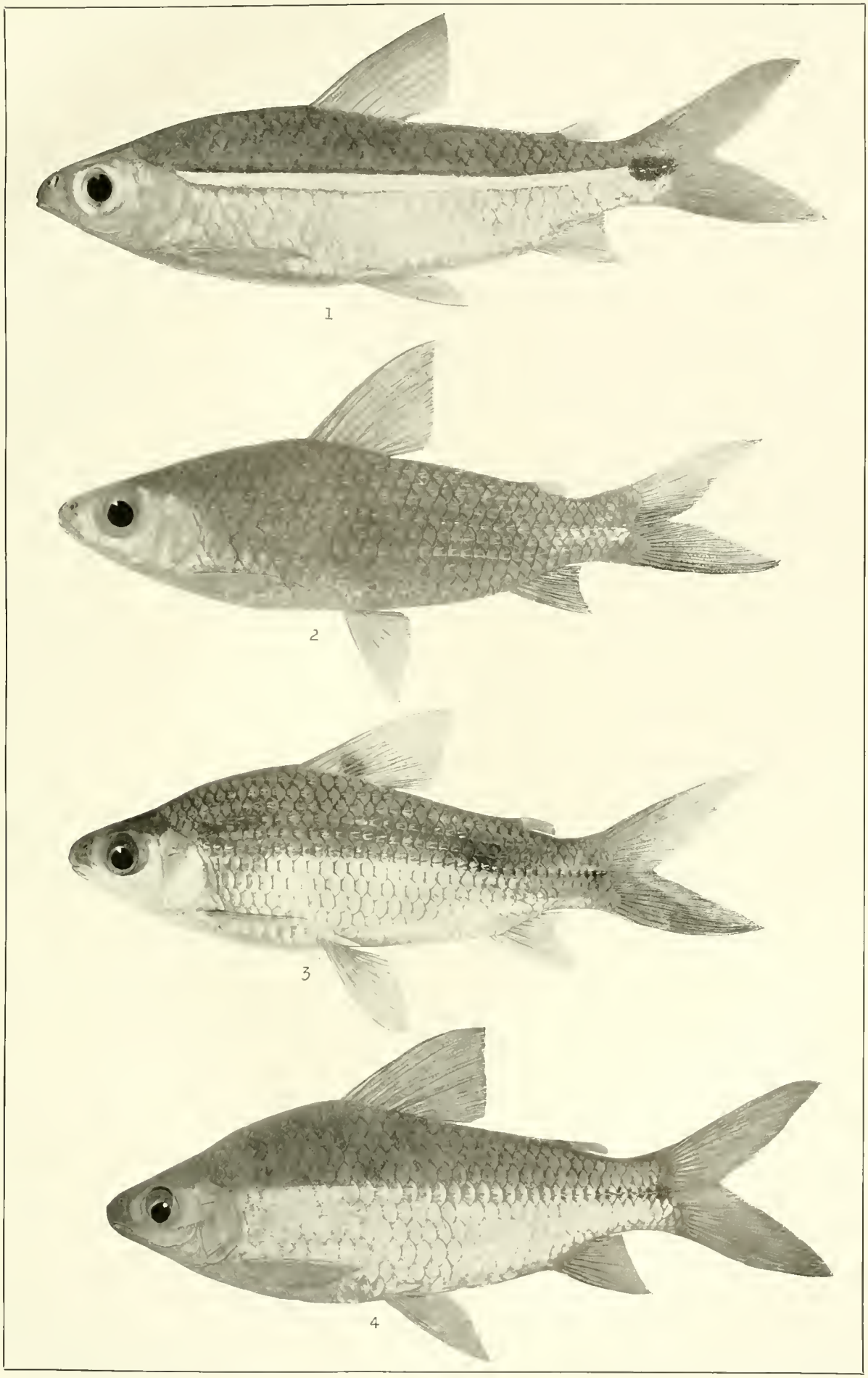
1. *Harttia platystoma* (GÜNTHER). Entire length, 160 mm. I. U. No. 11,939. 2. *Harttia platystoma* (GÜNTHER). Entire length, 92 mm. No. 1511. 3. *Loricariichthys platyurus* (MÜLLER and TROSCHEL). 142 mm. No. 1510. 4. *Loricariichthys brunneus* (HANCOCK). 53 mm. to anus. I. U. No. 11,934.



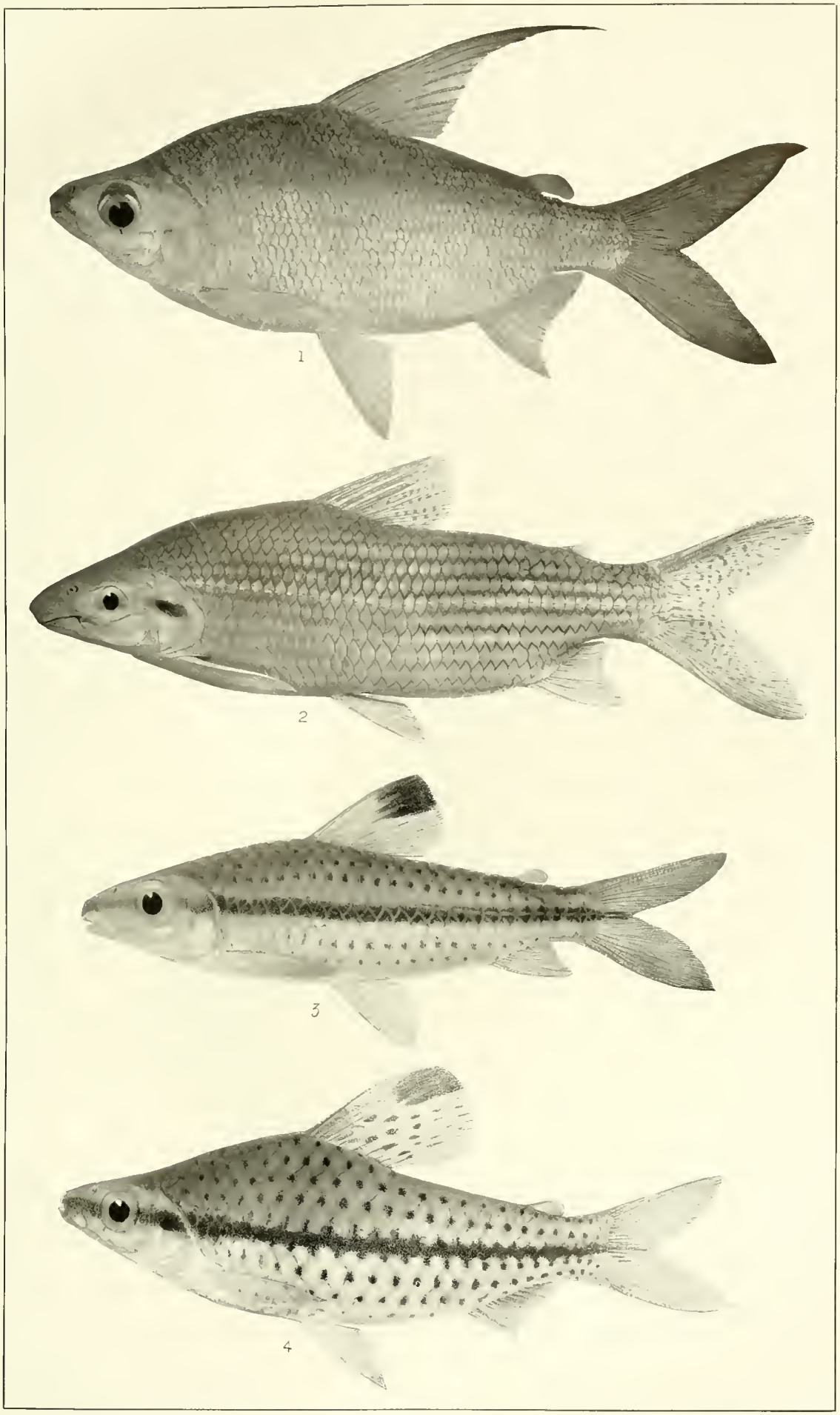
1. *Loricariichthys microdon* EIGENMANN. (Type.) 44 mm. to anus. No. 1507. 2. *Loricariichthys griseus* EIGENMANN. (Type.) 731 mm. entire length. No. 1504. 3. *Farlowella hargreavesi* EIGENMANN. (Type.) 170 mm. entire length. (Georgetown Museum.)



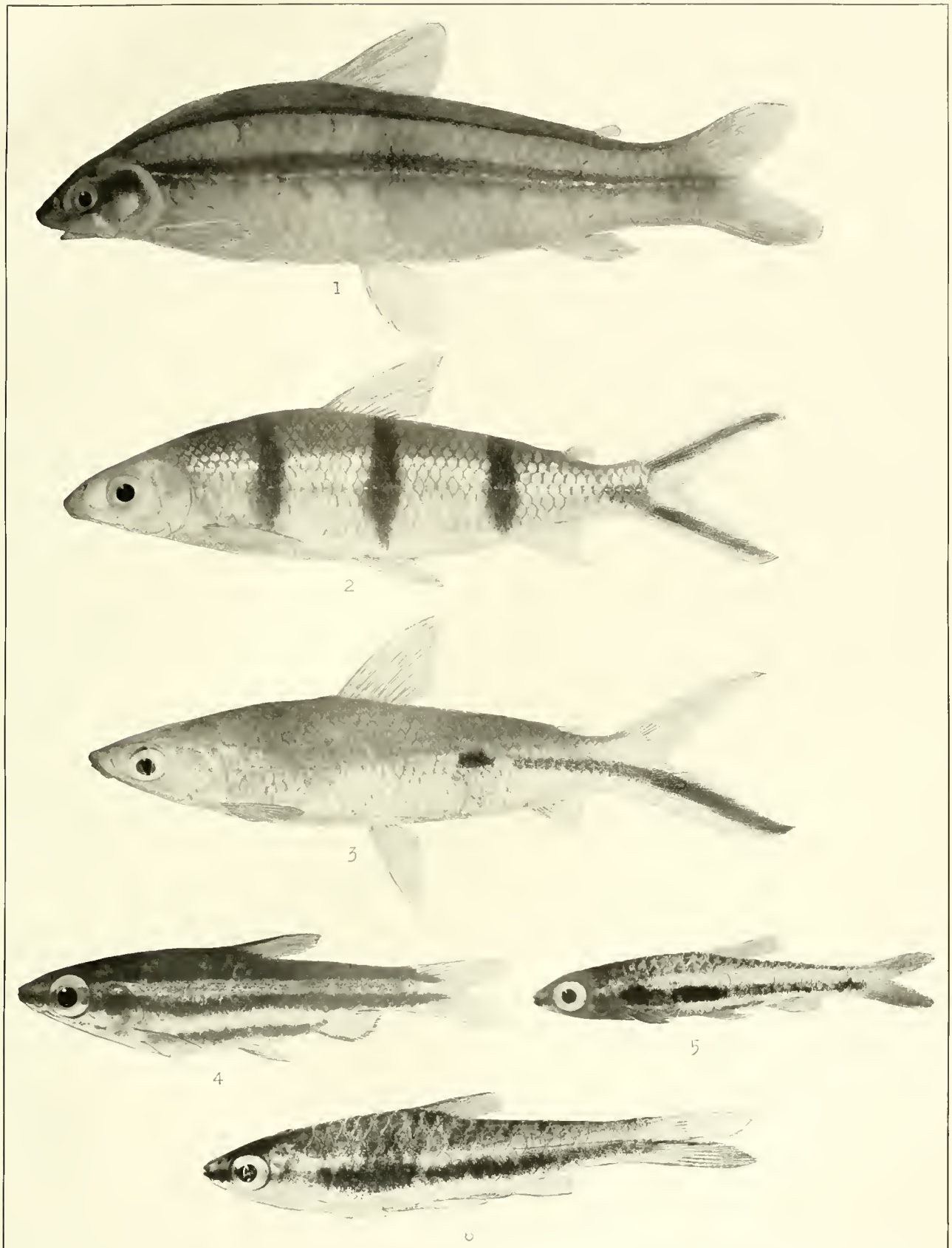
1. *Bivibranchia protractila* EIGENMANN. (Type.) 115 mm. No. 1873. 2*a*–2*e*. Gills of left side, beginning with the first at 2*a*. 3. Roof of mouth and gill-chambers, showing valves. 4. Floor of mouth and gill-chamber. 5. Sagittal section, showing valves of the roof of the mouth.



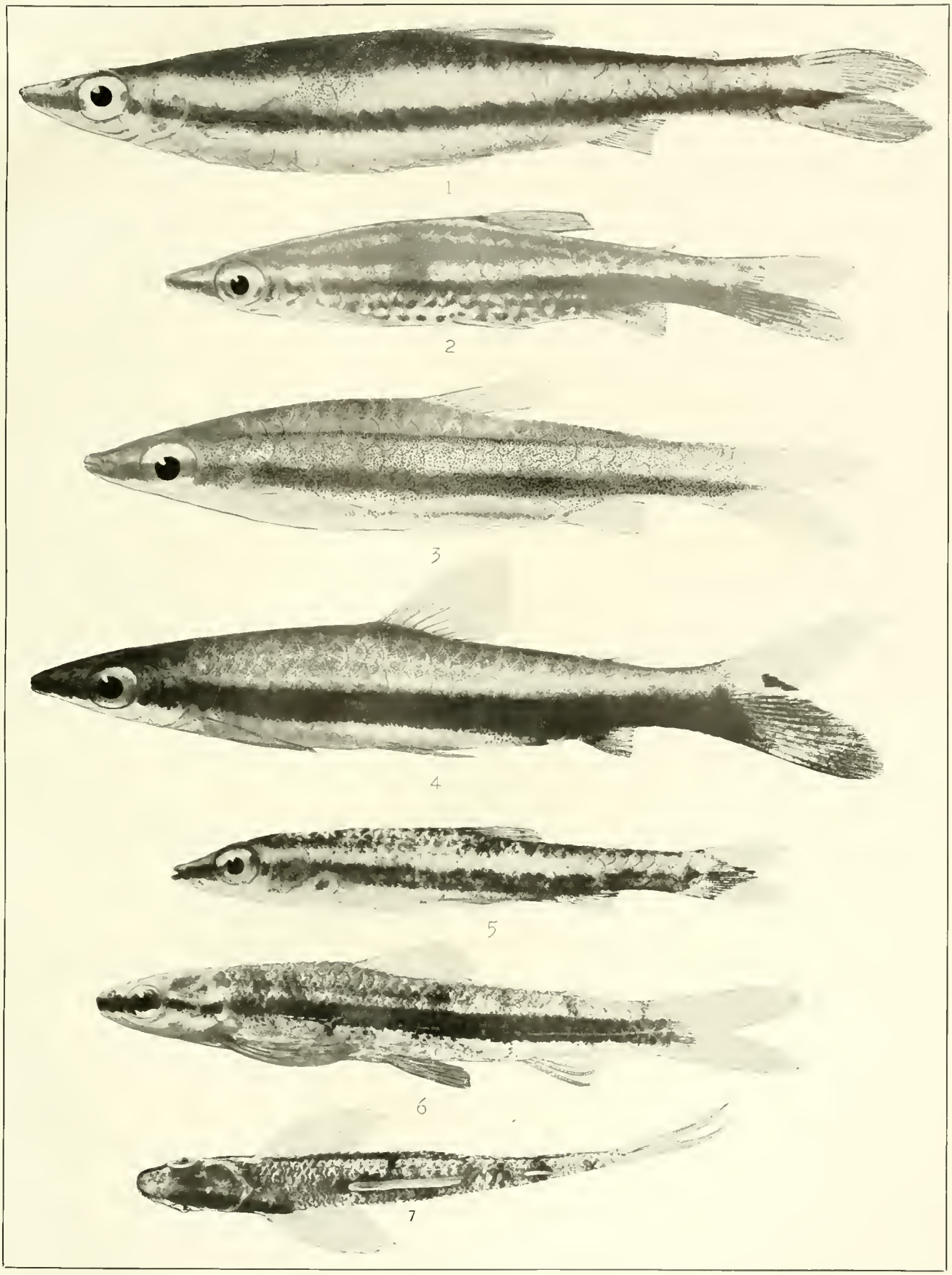
1. *Curimatus spilurus* GÜNTHER. 110 mm. No. 2095. 2. *Curimatus microcephalus* EIGENMANN and EIGENMANN. 103 mm. No. 2115. 3. *Curimatus morowhanna* EIGENMANN. (Type.) 90 mm. No. 2122. 4. *Curimatus issororocnsis* EIGENMANN. (Type.) 104 mm. No. 2119.



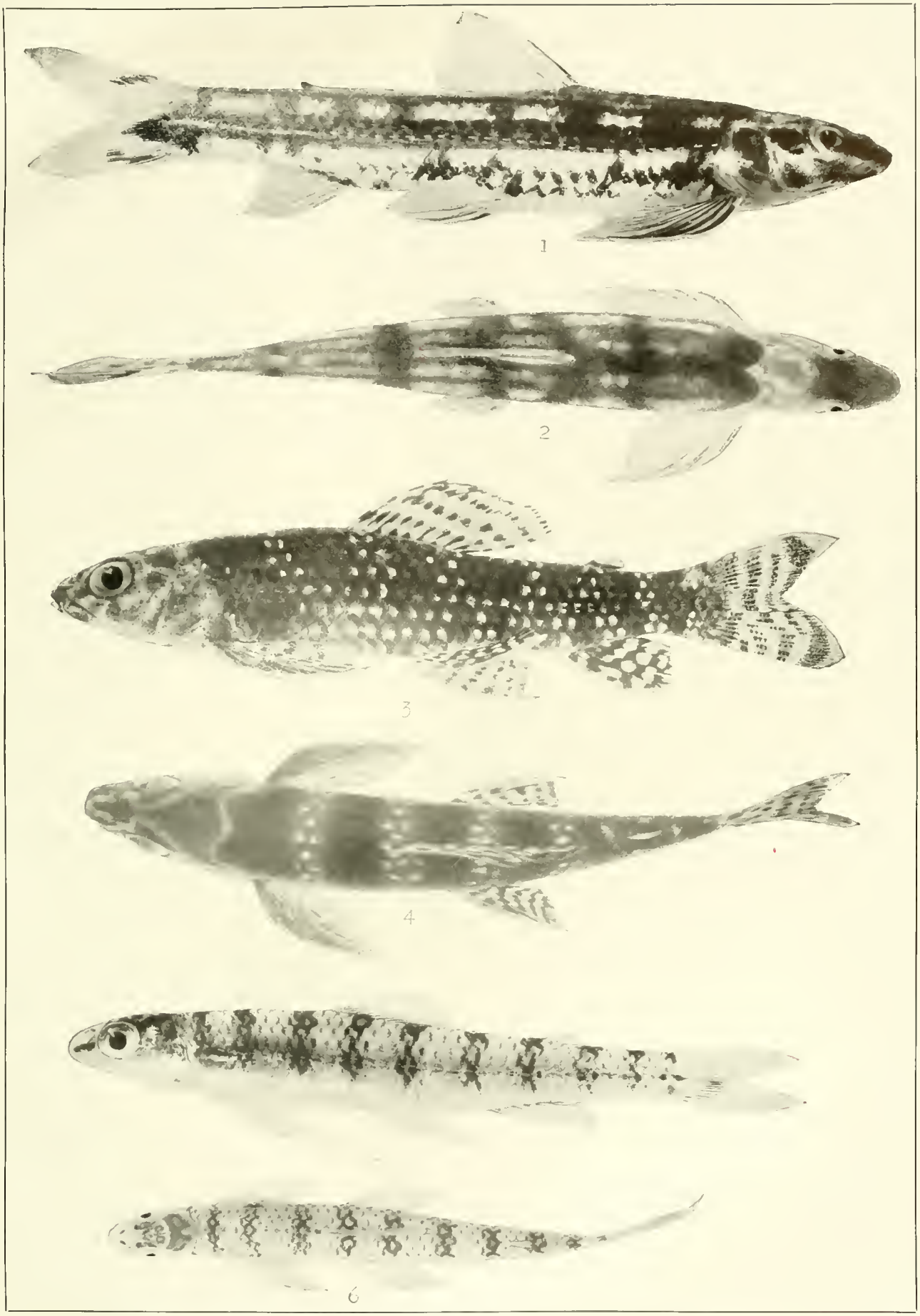
1. *Curimatus schomburgki* GÜNTHER. 146 mm. No. 2071*a*. 2. *Prochilodus maripicru* EIGENMANN. (Type.) 282 mm. No. 2066. 3. *Tylobronchus maculosus* EIGENMANN. (Type.) 113 mm. No. 1923. 4. *Chilodus punctatus* MÜLLER and TROSCHEL. 77 mm. No. 1916.



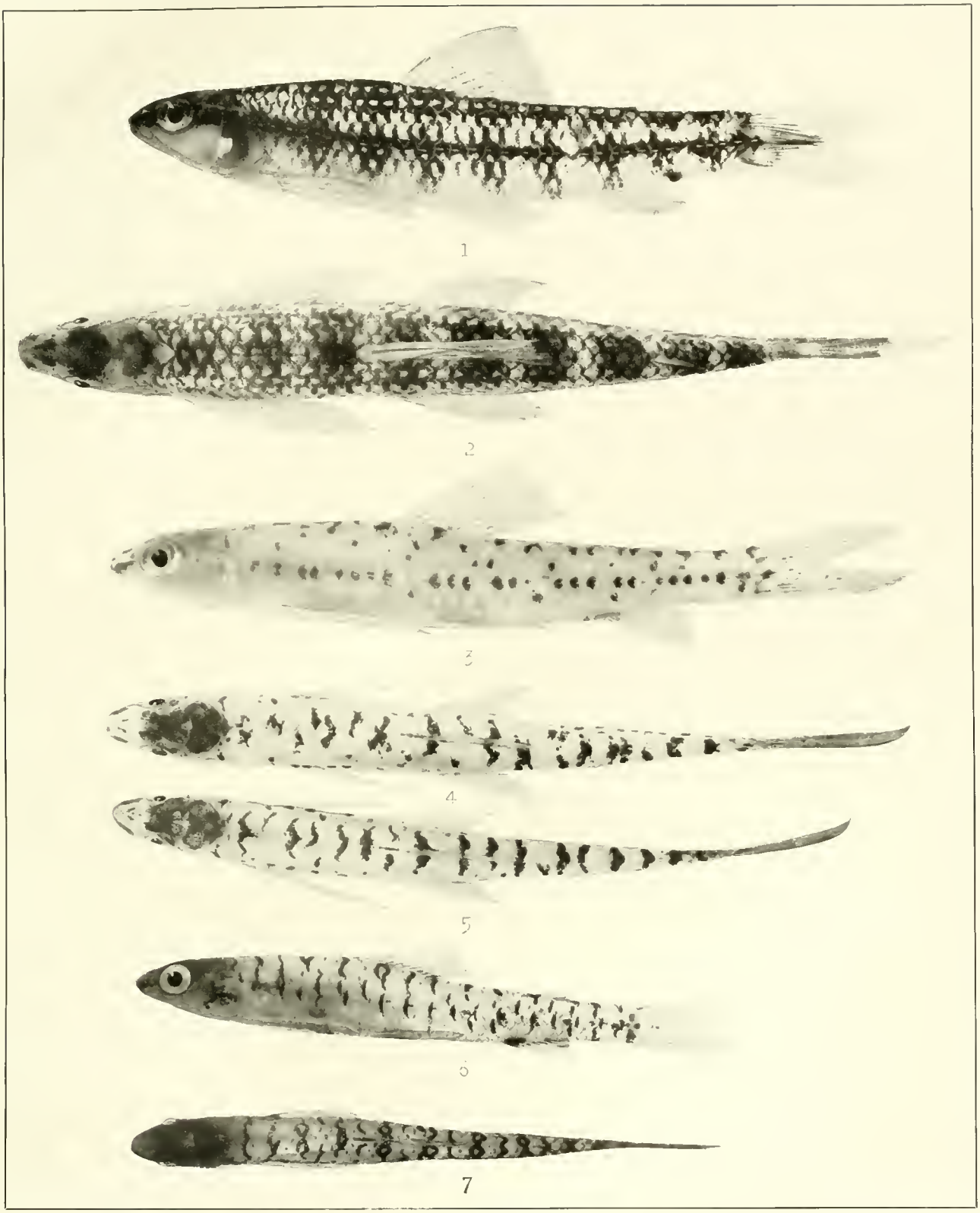
1. *Parodon bifasciatus* EIGENMANN. (Type.) 104 mm. No. 1925. 2. *Hemiodus quadrimaculatus* PELLEGRIN. 125 mm. No. 1930. 3. *Hemiodus semitaeniatus* KNER. 79 mm. No. 1932. 4. *Nannostomus marginatus* EIGENMANN. (Type.) 26 mm. No. 1171. 5. *Nannostomus minimus* EIGENMANN. (Type.) 21 mm. No. 1165. 6. *Nannostomus simplex* EIGENMANN. (Type.) 25 mm. No. 1167.



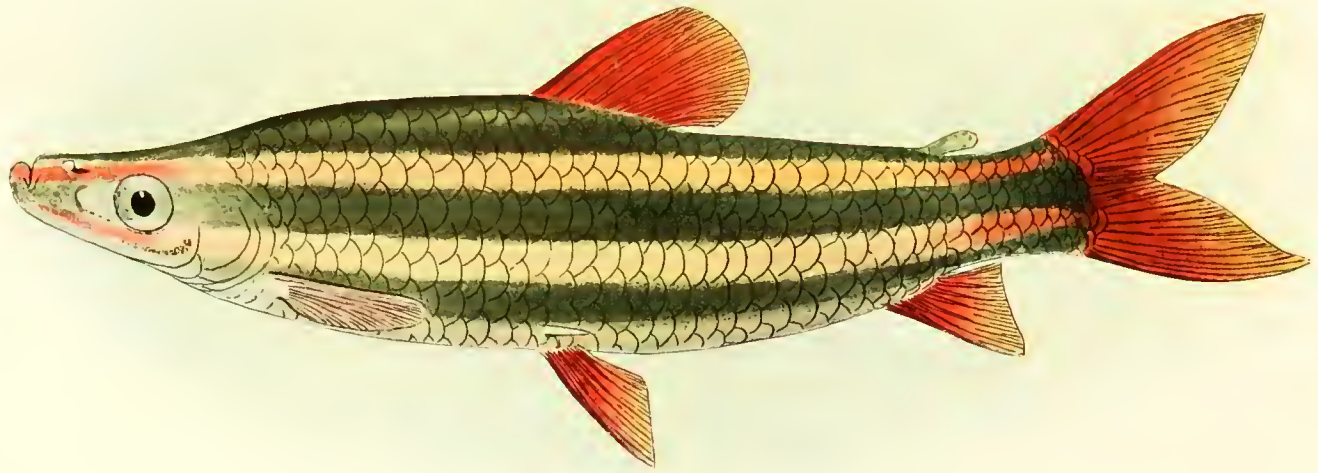
1. *Pœcilobrycon harrisoni* EIGENMANN. (Type.) 55 mm. No. 1160. 2. *Pœcilobrycon trifasciatus* (STEINDACHNER). 32 mm. No. 1161. 3. *Pœcilobrycon erythrurus* EIGENMANN. (Type.) 33 mm. No. 1168. 4. *Pœcilobrycon ocellatus* EIGENMANN. (Type.) 41 mm. No. 1179. 5. *Archicheir minutus* EIGENMANN. (Type.) 26 mm. No. 1186. 6. *Characidium laterale* EIGENMANN. (Type.) 37 mm. No. 1141. 7. *Characidium lateralc* EIGENMANN. (Cotype.) Dorsal view. 35 mm. I. U. No. 11,673.



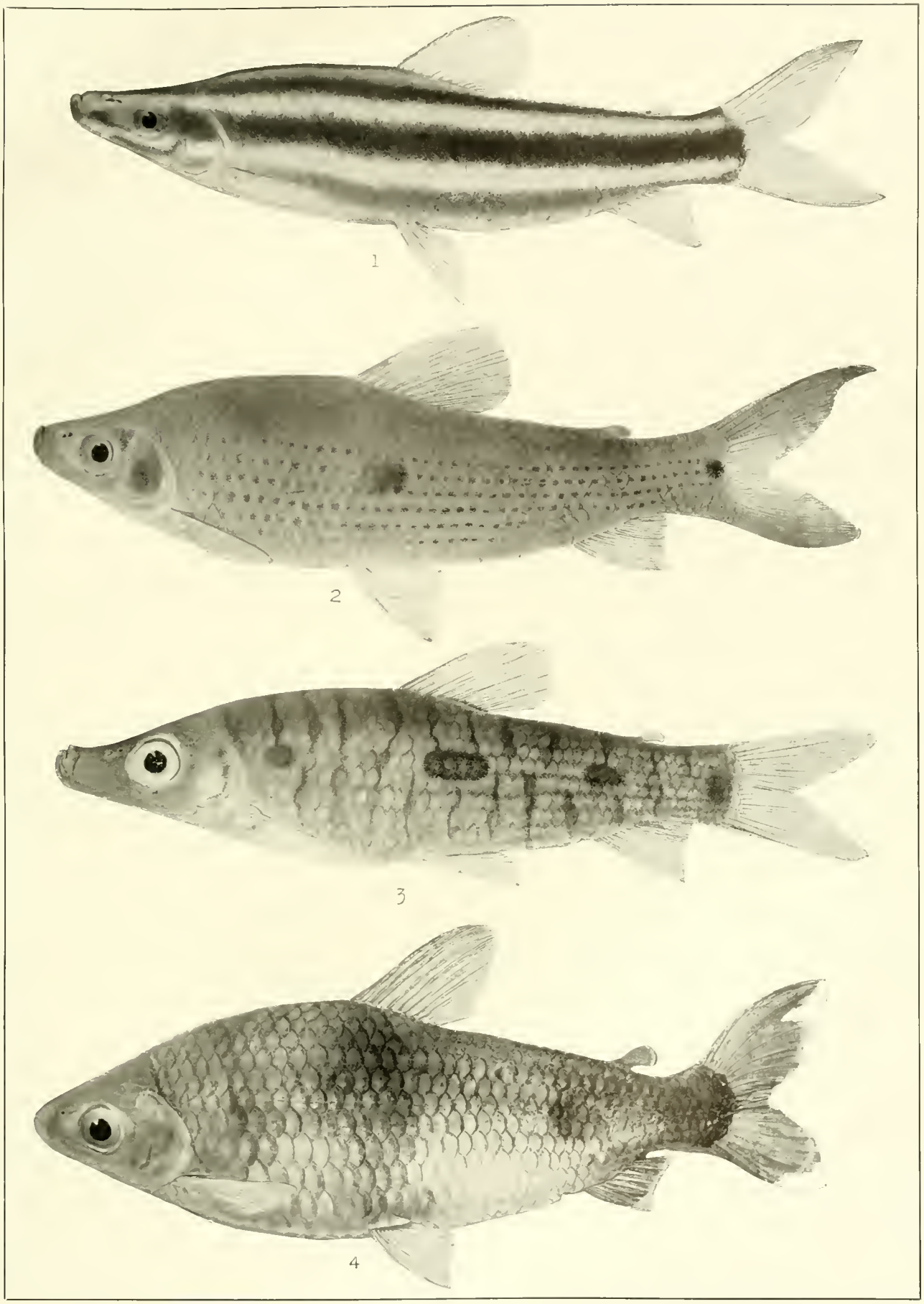
1. *Characidium vintoni* EIGENMANN. (Type.) 76 mm. No. 1142. 2. *Characidium vintoni* EIGENMANN. Dorsal view. 3. *Characidium blennioides* EIGENMANN. (Type.) 52 mm. No. 1144. 4. *Characidium blennioides* EIGENMANN. Dorsal view. 5. *Characidium catenatum* EIGENMANN. (Type.) 38 mm. No. 1153. 6. *Characidium catenatum* EIGENMANN. Dorsal view.



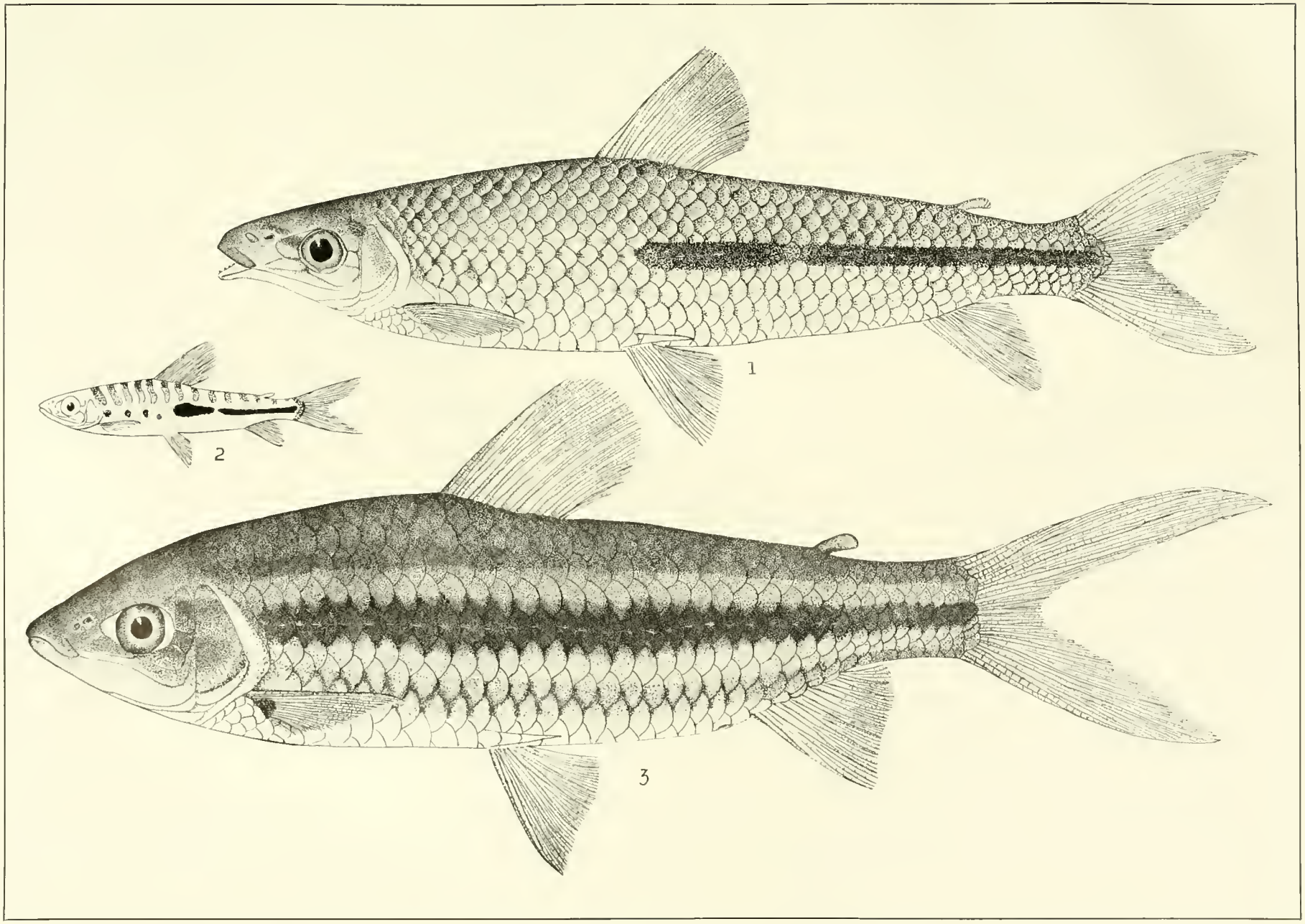
1. *Characidium fasciatum* REINHARDT. 52.5 mm. No. 1151. 2. *Characidium fasciatum* REINHARDT. Dorsal view. 3. *Characidium pellucidum* EIGENMANN. (Type.) 39 mm. No. 1156. 4. *Characidium pellucidum* EIGENMANN. Dorsal view. 5. *Characidium pellucidum* EIGENMANN. (Cotype.) 37 mm. I. U. No. 11,683. 6. *Characidium pteroides* EIGENMANN. (Type.) 28 mm. No. 1157. 7. *Characidium pteroides* EIGENMANN. (Cotype.) 27 mm. I. U. No. 11,684.



Anostomus Anostomus (Linnæus), 120 mm. C. M. No. 1856a

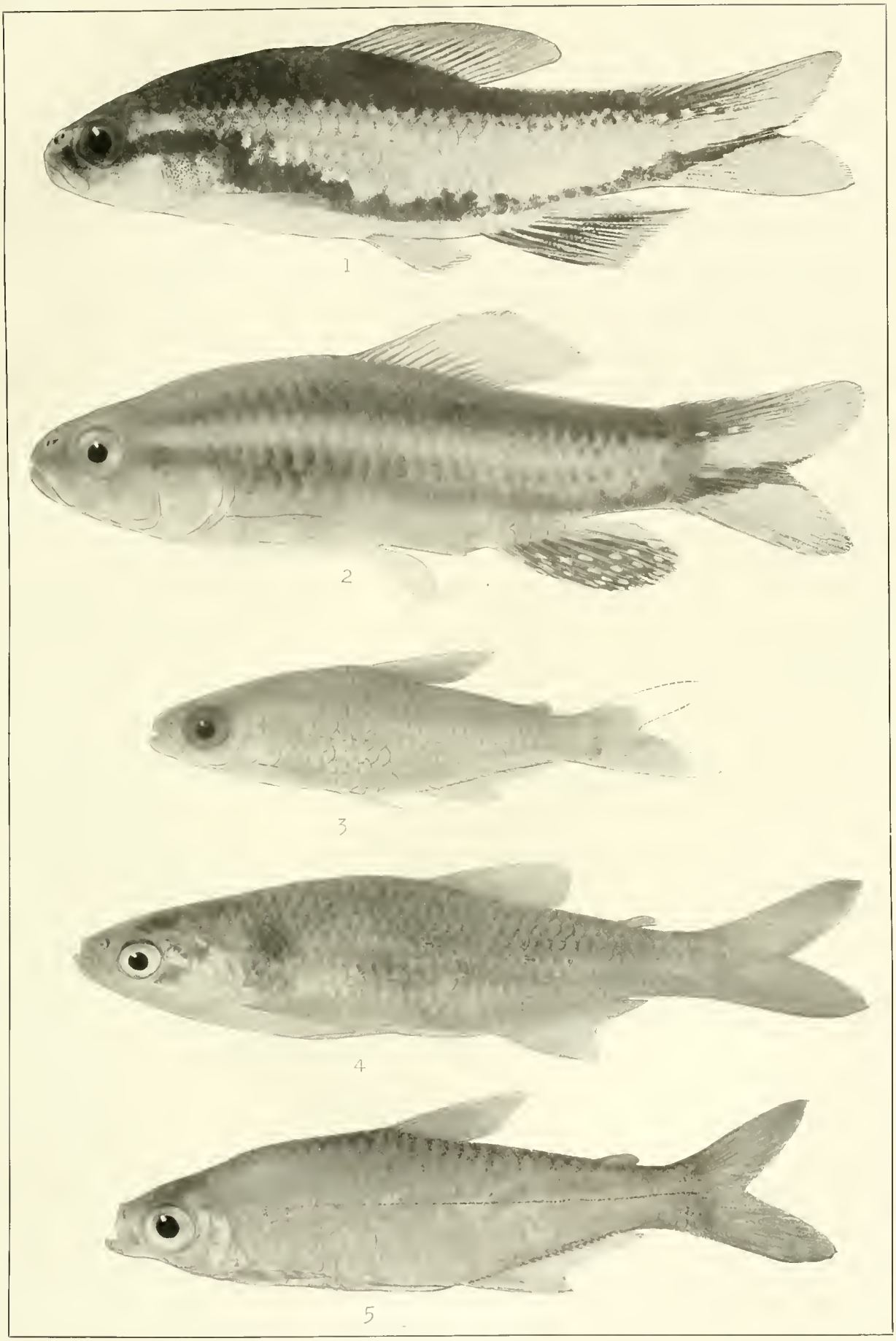


1. *Anostomus anostomus* (LINNÆUS). 120 mm. No. 1856*a*. 2. *Anostomus trimaculatus* (KNER.) 123 mm. No. 1858. 3. *Anostomus plicatus* EIGENMANN. (Type.) 86 mm. No. 1861. 4. *Schizodontopsis laticeps* EIGENMANN. (Type.) 264 mm. No. 1825.

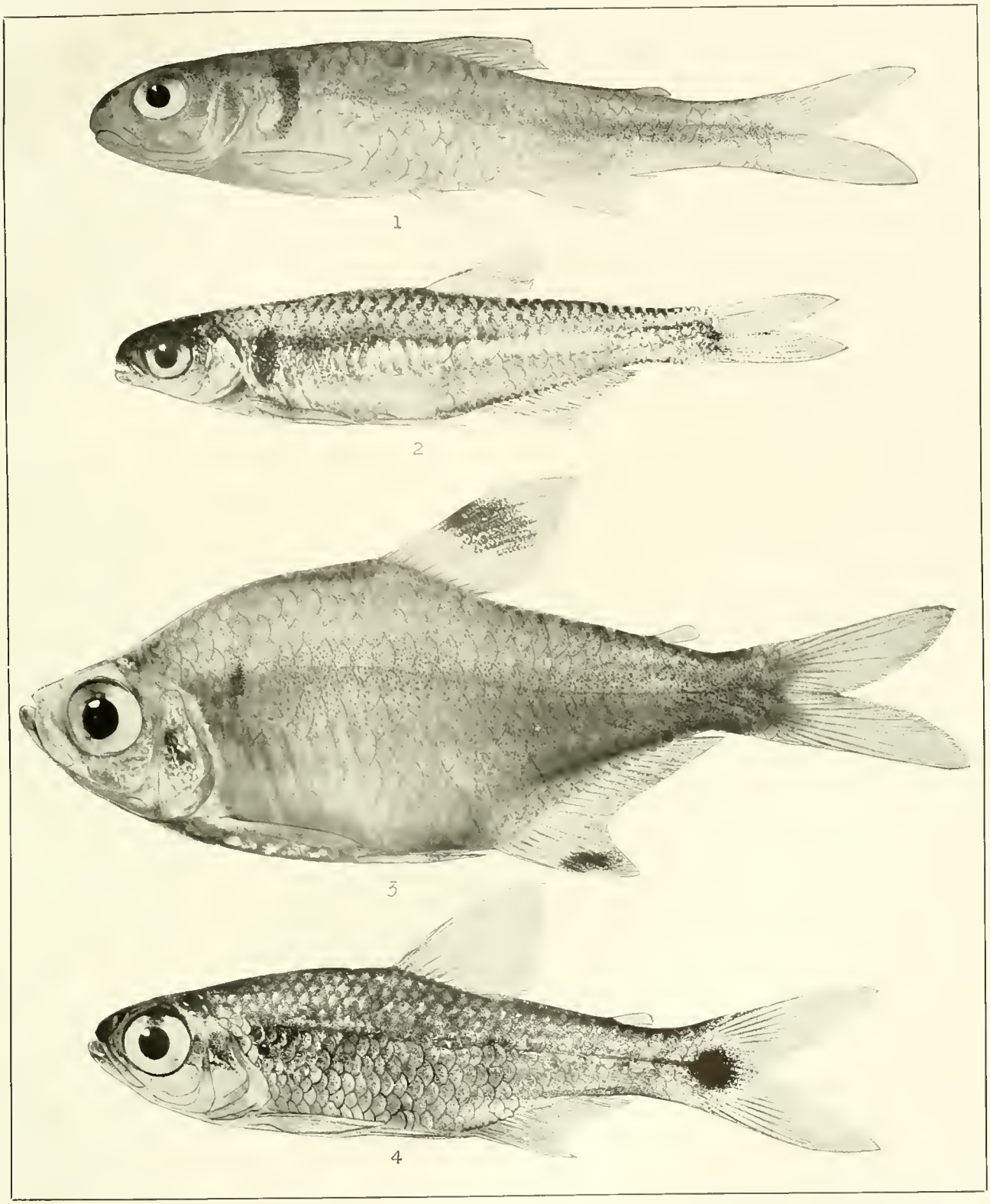


1. *Leporinus nigrotæniatus* (SCHOMBURGK). 203 mm. to middle caudal rays. No. 1823. 2. *Leporinus nigrotæniatus* (SCHOMBURGK). 45 mm. No. 1824.
3. *Leporinus arcus* EIGENMANN. (Type) 206 mm. No. 1832.

1. *Leporinus alternus* EIGENMANN. (Type.) 200 mm. No. 1827. 2. *Leporinus maculatus* MÜLLER and TROSCHEL. 73 mm. I. U. No. 12,127. 3. *Leporinus granti* EIGENMANN. (Type.) 144 mm. No. 1851. 4. *Leporinus friderici* (BLOCH). 64 mm. No. 2214.

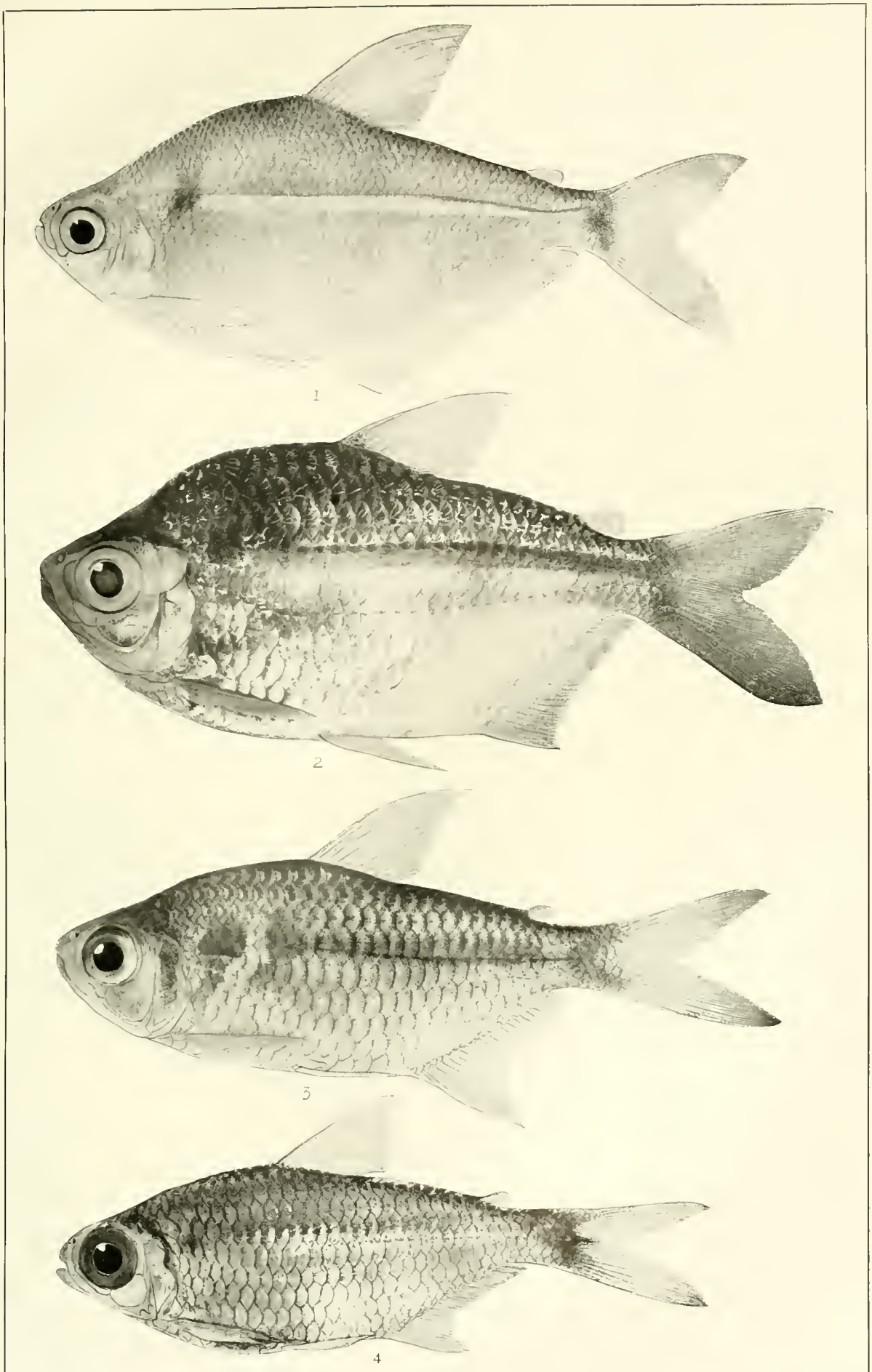


1. *Pacilocharax bovallii* EIGENMANN. (Type, ♂.) 43 mm. No. 1136*a*. 2. *Pacilocharax bovallii* EIGENMANN. (Type, ♀.) 40 mm. No. 1136*b*. 3. *Odontostilbe melandetus* EIGENMANN. (Type.) 27 mm. No. 1878. 4. *Aphyocharax erythrurus* EIGENMANN. (Type.) 57 mm. No. 1879. 5. *Aphyodite grammica* EIGENMANN. (Type.) 32 mm. No. 1882.

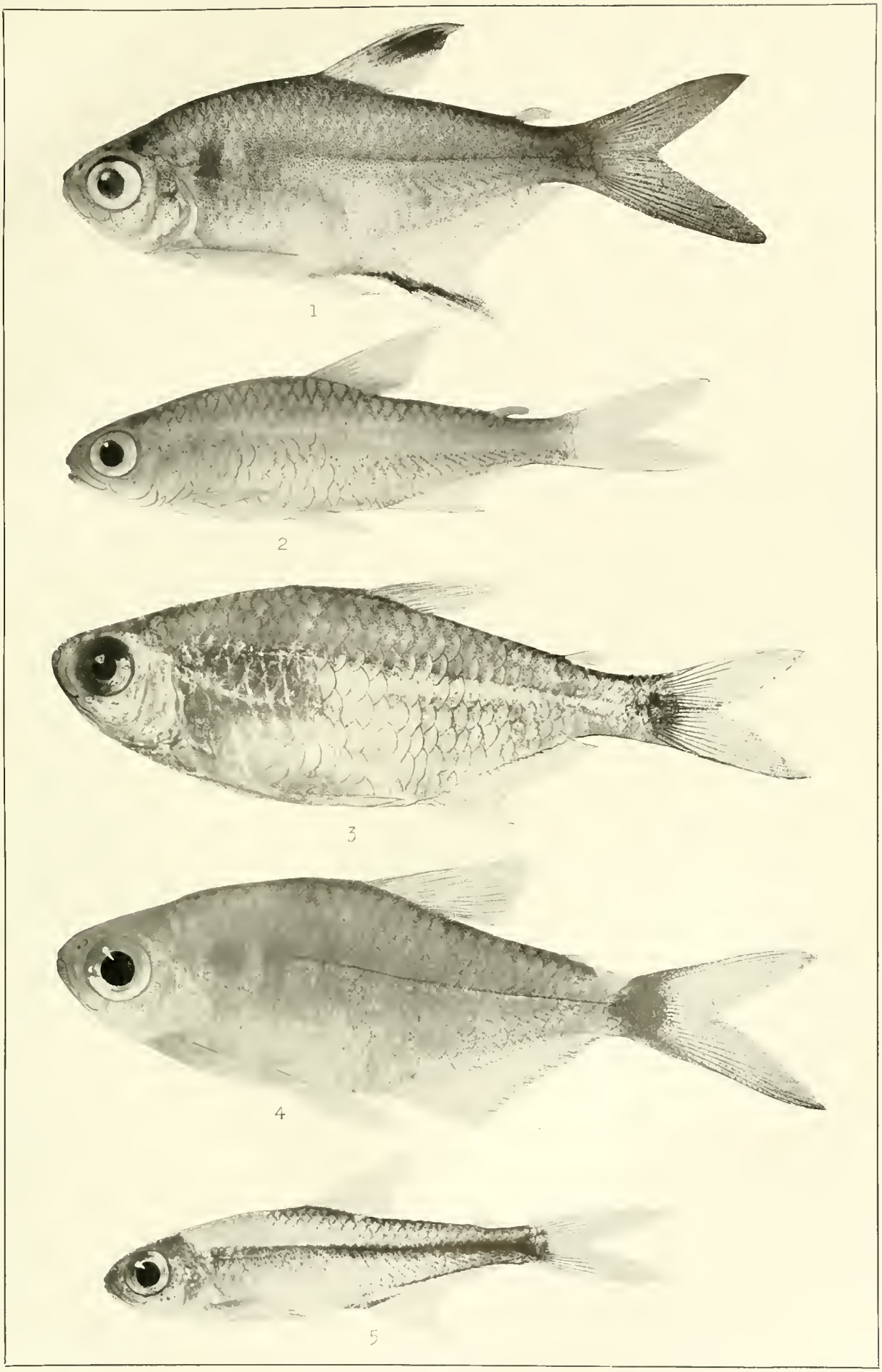


1. *Creagrutus melanzonus* EIGENMANN. (Type.) 44 mm. No. 1067. 2. *Bryconamericus hyphessus* EIGENMANN. (Type.) 37.5 mm. No. 1070. 3. *Pristella riddlei* (MEEK). 44.5 mm. No. 1309. 4. *Pristella aubynei* EIGENMANN. (Type.) 50 mm No. 1042.

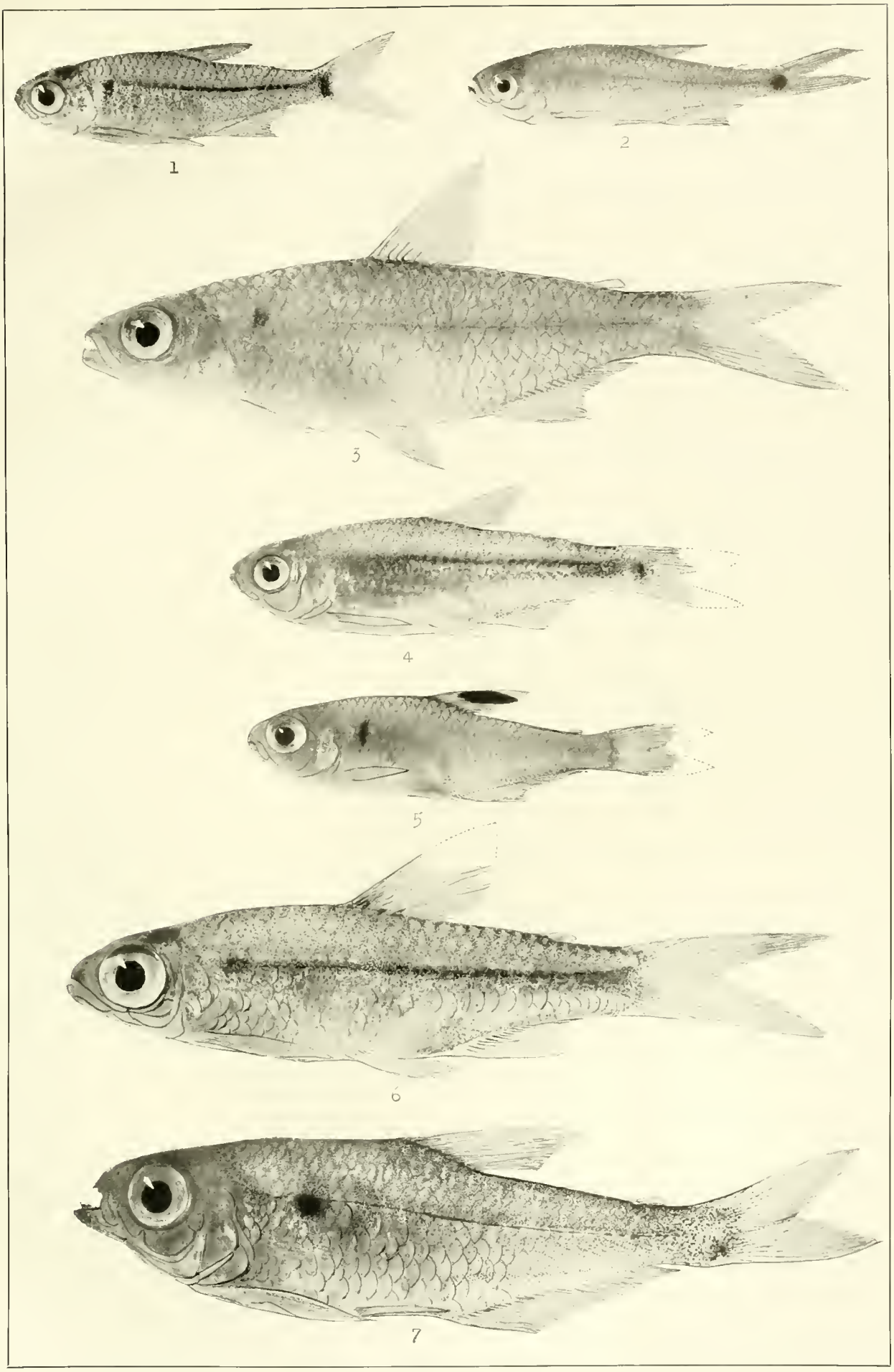
1. *Mænkhausia profunda* EIGENMANN. (Type.) 51 mm. No. 2207. 2. *Fowlerina orbicularis* (CUVIER and VALENCIENNES). 65 mm. No. 2454. 3, *Mænkhausia oligolepis* (GÜNTHER). 58 mm Mem. Mus. Comp. Zool., from an unpublished plate.



1. *Ctenobrycon spilurus* (CUVIER and VALENCIENNES). 71 mm. No. 1425. 2. *Mænkhausia grandisquamis* (MÜLLER and TROSCHEL). 100 mm. No. 1350. 3. *Mænkhausia browni* EIGENMANN. (Type.) 66 mm. No. 1004. 4. *Mænkhausia shideleri* EIGENMANN. (Type.) 65 mm. No. 1012.



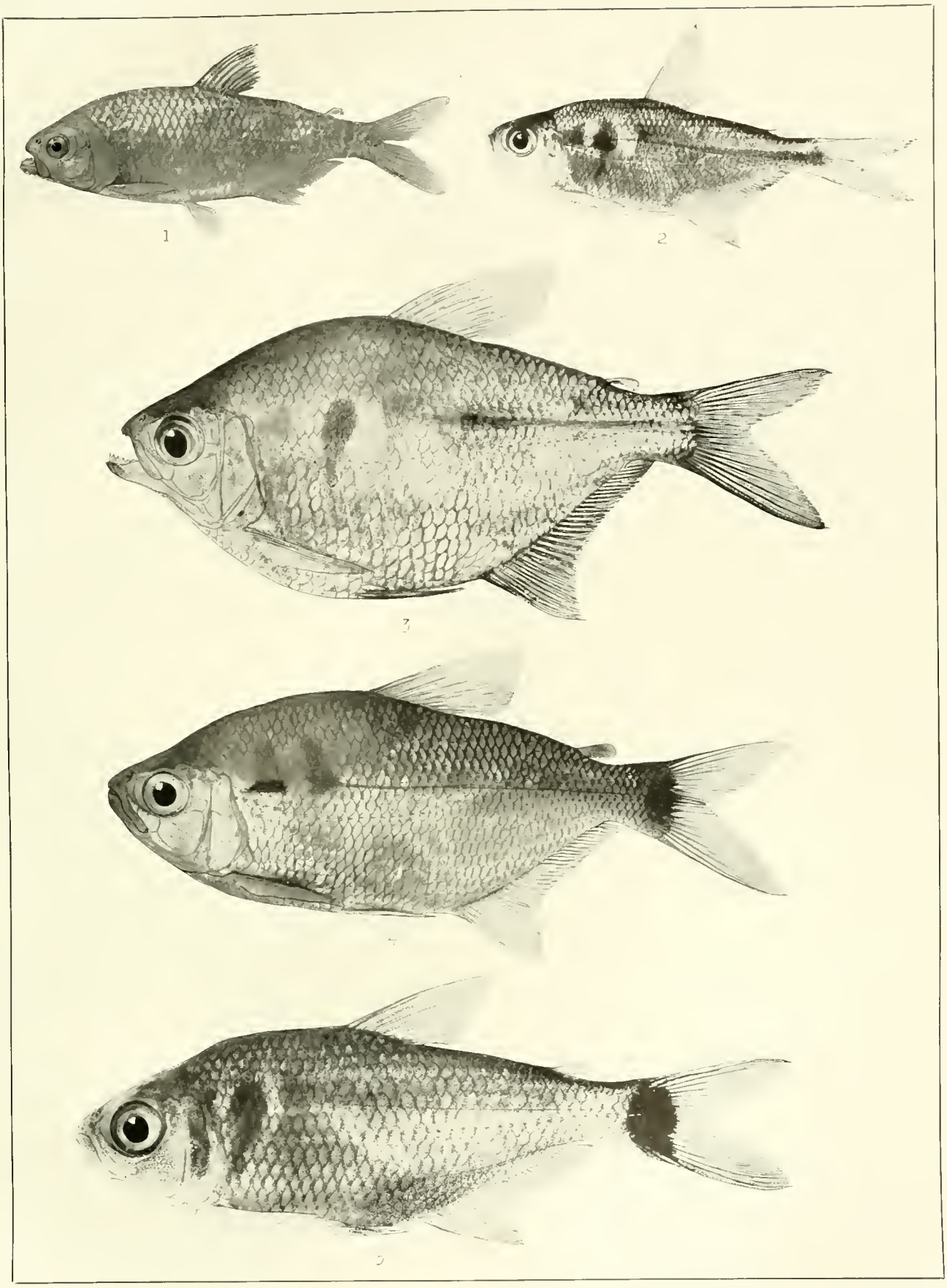
1. *Hemigrammus unilineatus* GILL. 40 mm. No. 1446. 2. *Hemigrammus erythrozonus* DURBIN. (Type.) 32 mm. No. 1448. 3. *Hemigrammus rodwayi* DURBIN. (Type.) 46 mm. No. 1450. 4. *Hemigrammus ocellifer* (STEINDACHNER). 40 mm. No. 1455. 5. *Hemigrammus orthus* DURBIN. (Type.) 27 mm. No. 1477.



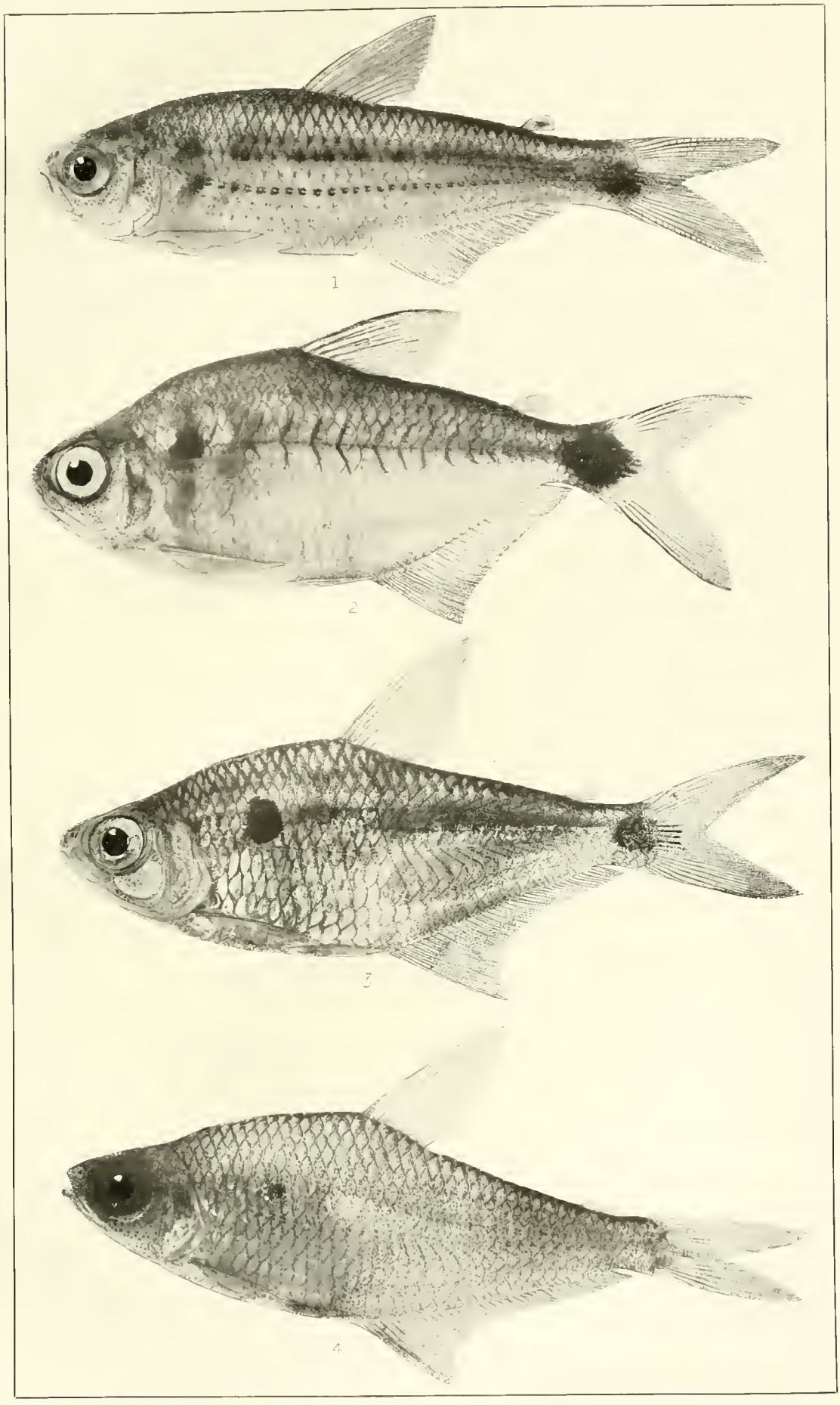
1. *Hemigrammus iota* DURBIN. (Type.) 18 mm. No. 1458. 2. *Hyphessobrycon minimus* DURBIN. (Type.) 18 mm. No. 1193. 3. *Hemigrammus cylindricus* DURBIN. (Type.) 57 mm. No. 1461. 4. *Hyphessobrycon gracilis* (REINHARDT). 24 mm. No. 1247. 5. *Hyphessobrycon minor* DURBIN. (Type.) 19 mm. No. 1189. 6. *Hemigrammus analis* DURBIN. (Type.) 35 mm. No. 1466. 7. *Hyphessobrycon stictus* DURBIN. (Type.) 38 mm. No. 1197.

1. *Hyphessobrycon rosaceus* DURBIN. (Type.) 36 mm. No. 1190. 2. *Hyphessobrycon eos* DURBIN. (Type.) 36 mm. No. 1194. 3. *Creatochanes affinis* GÜNTHER. 96 mm. No. 1407. 4. *Creatochanes melanurus* (BLOCH). 96 mm. No. 1393. 5. *Creatochanes caudomaculatus* GÜNTHER. 100 mm. No. 1385.

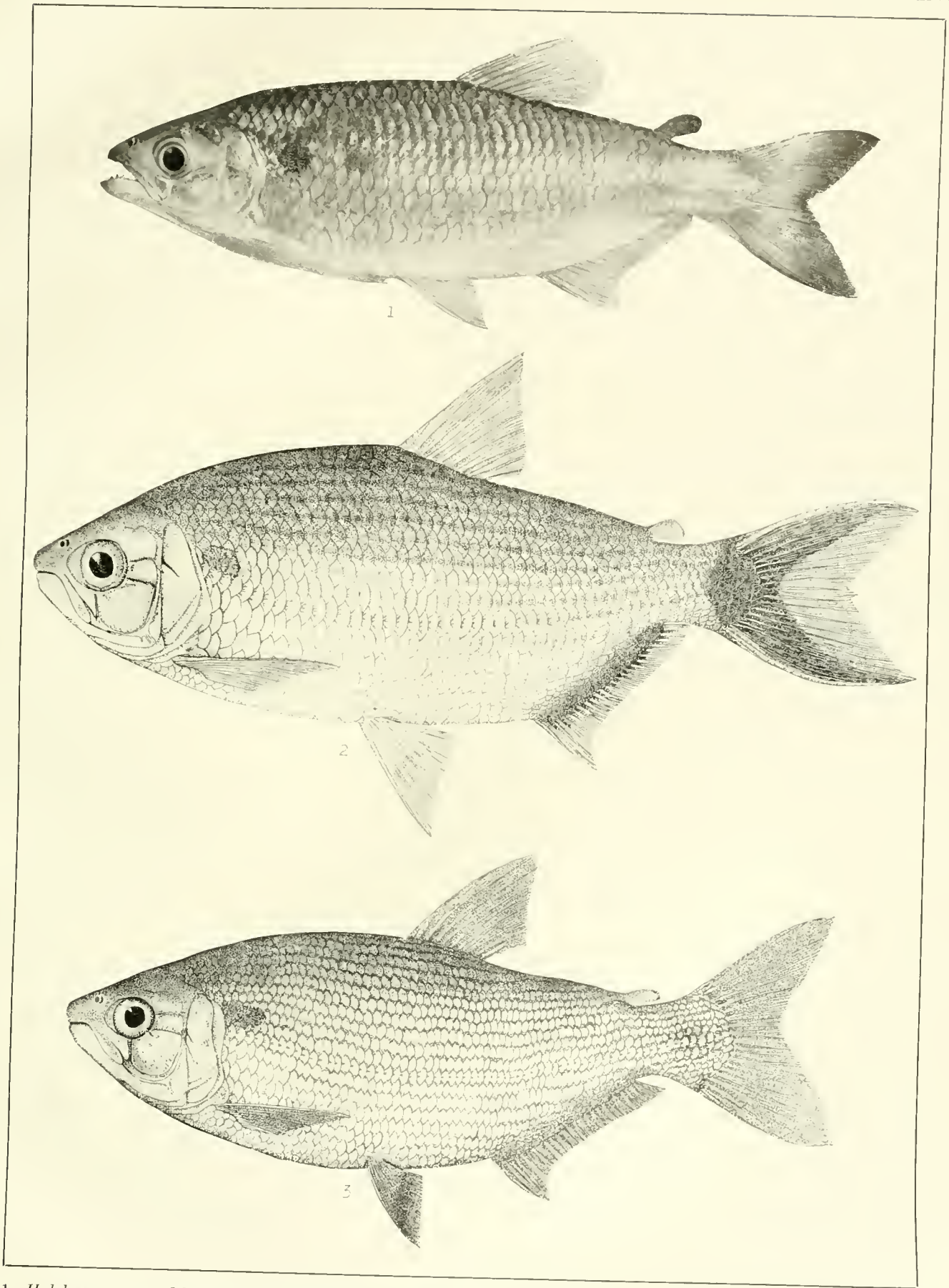
1. *Astyanax guianensis* EIGENMANN. (Type.) 51 mm. No. 1013. 2. *Astyanax essequibensis* EIGENMANN. (Type.) 53 mm. No. 1018. 3. *Astyanax mutator* EIGENMANN. (Type.) 53 mm. No. 1023. 4. *Astyanax micronatus* EIGENMANN. (Type.) 53 mm. No. 1025.



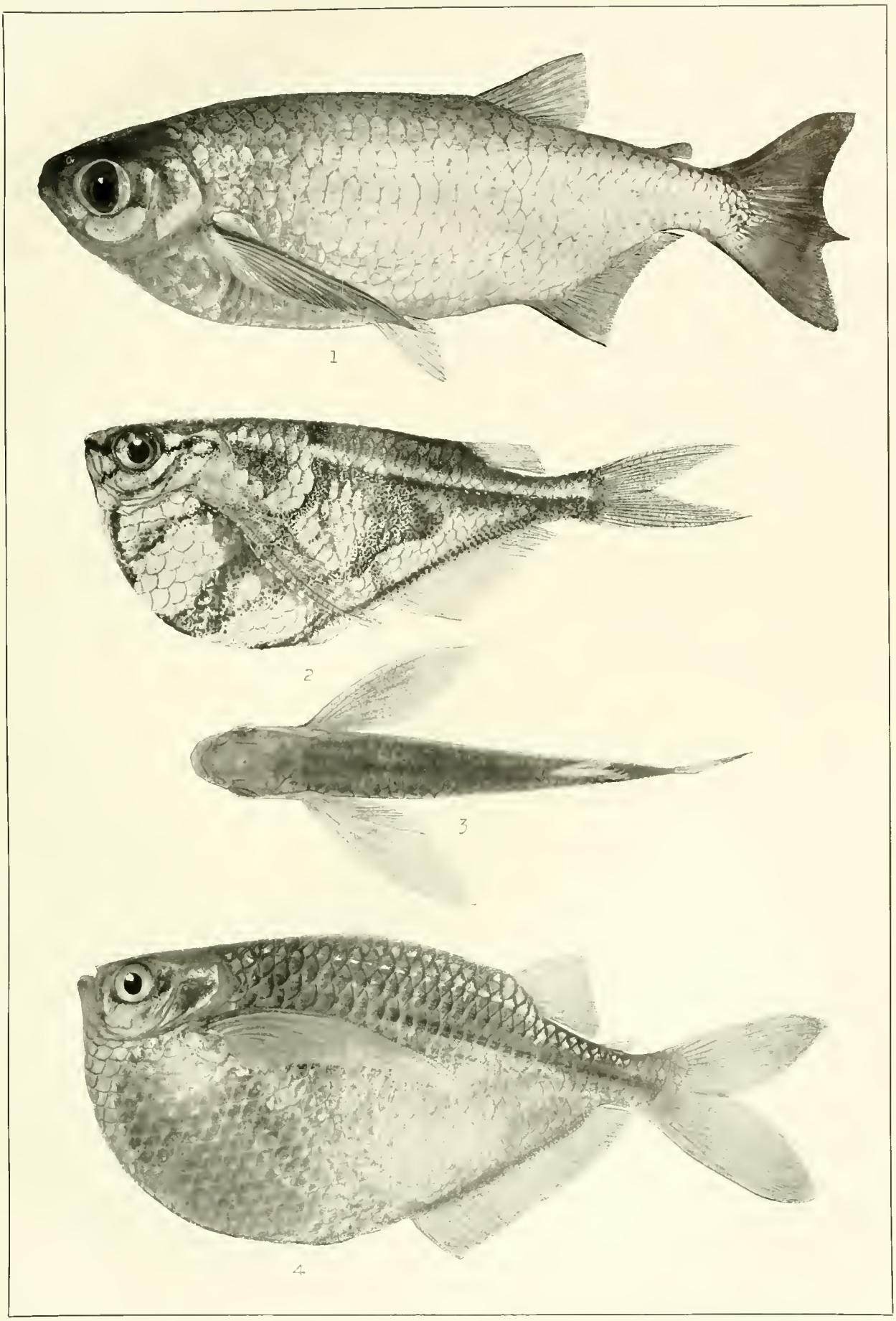
1. *Astyanax wappi* (CUVIER and VALENCIENNES). From specimens in British Museum. 2. *Paciluriehthys polylepis* (GÜNTHER). 50 mm. No. 1419*a*. 3. *Paciluriehthys polylepis* (GÜNTHER). 84 mm. No. 1419*b*. 4. *Paciluriehthys abramoides* EIGENMANN. (Type.) 112 mm. No. 1028. 5. *Paciluriehthys potaroënsis* EIGENMANN. (Type.) 58 mm. No. 1037.



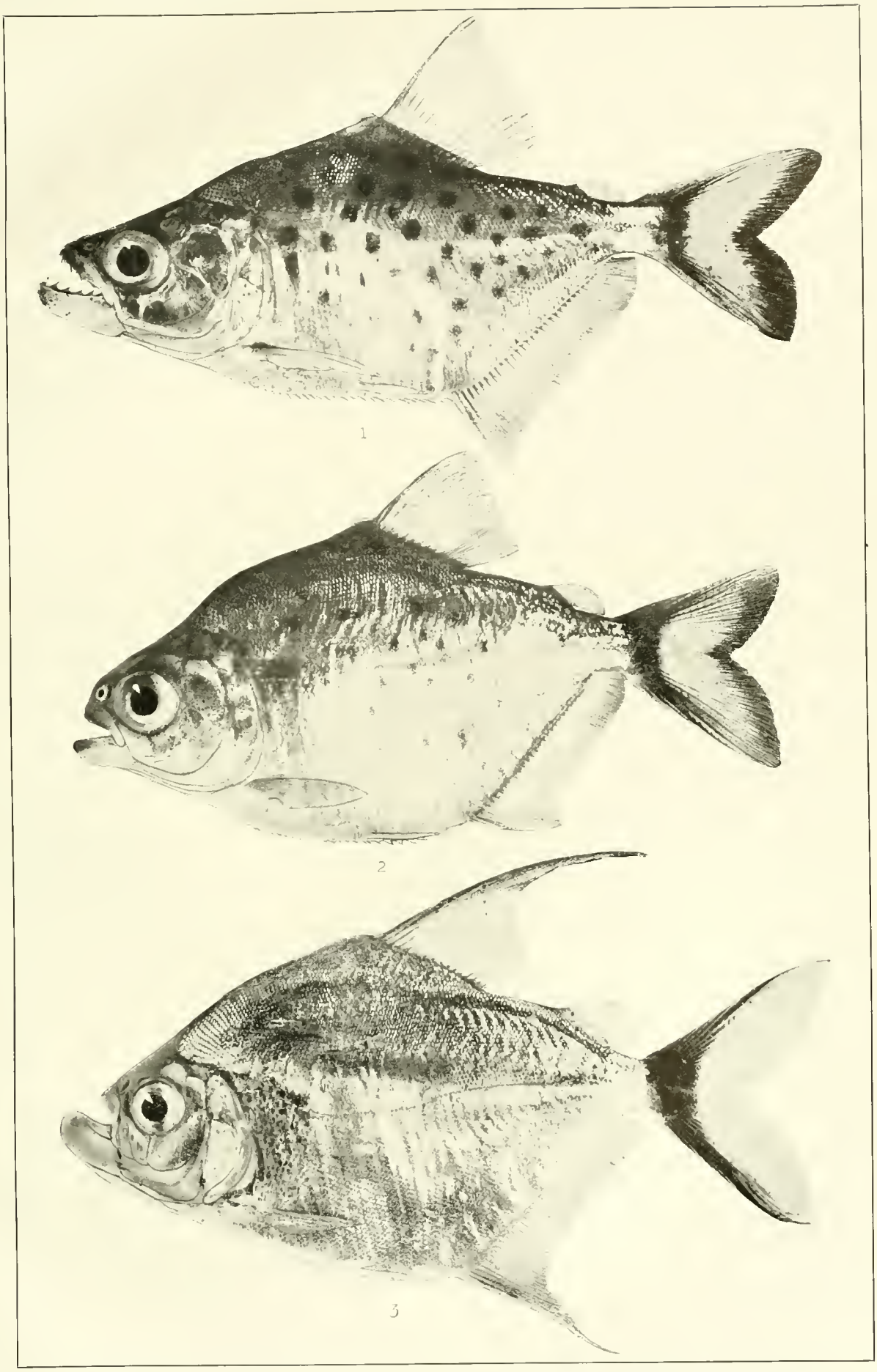
1. *Deuterodon potarocnsis* EIGENMANN. (Type.) 43 mm. No. 1053. 2. *Deuterodon pinnatus* EIGENMANN. (Type.) 62 mm. No. 1046. 3. *Phenacogaster megalostictus* EIGENMANN. (Type.) 65 mm. No. 1050. 4. *Phenacogaster microstictus* EIGENMANN. (Type.) 48 mm. No. 1063.



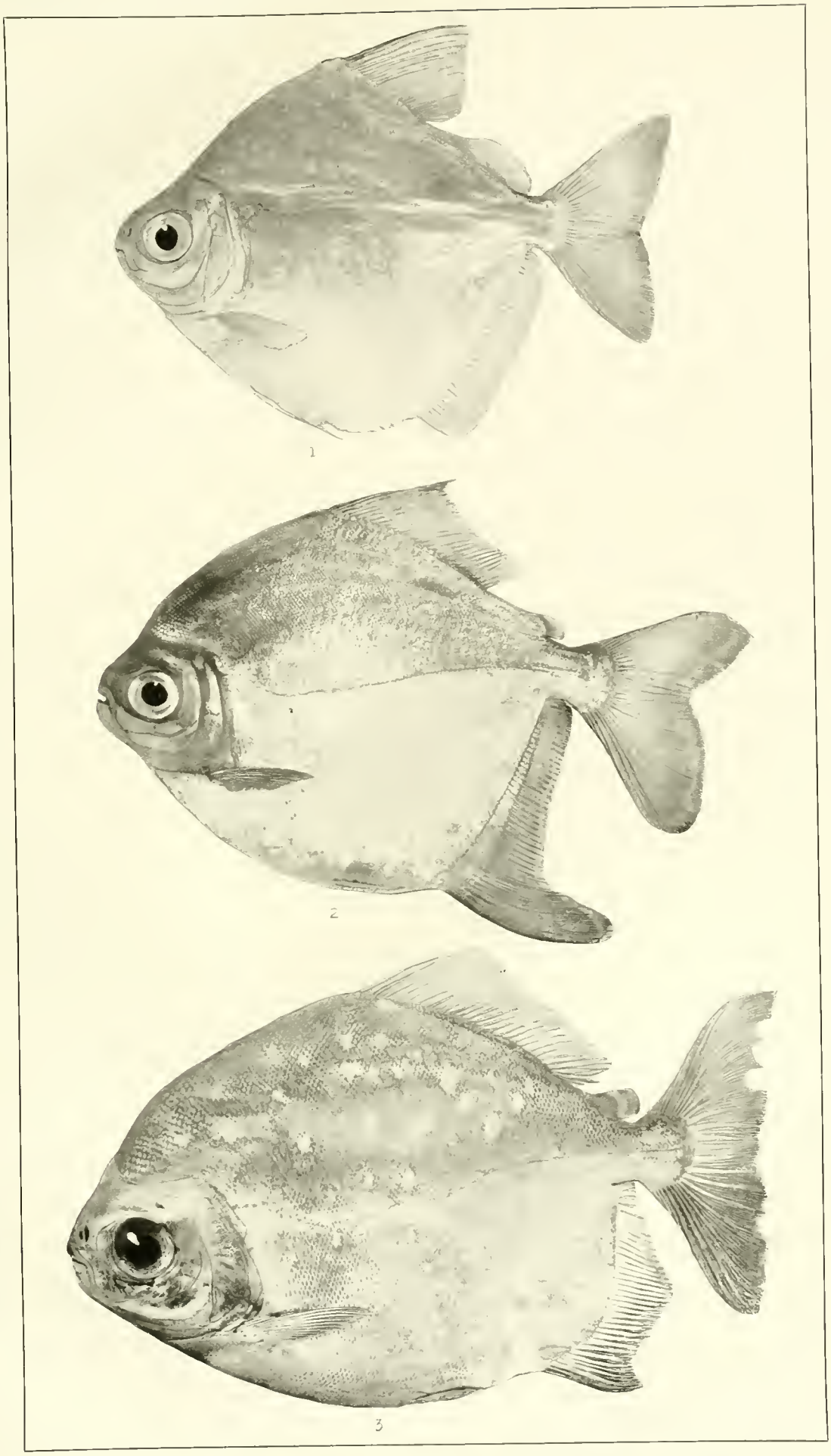
1. *Holobrycon pesu* (MÜLLER and TROSCHEL). 150 mm. I. U. No. 12,105. 2. *Brycon falcatus* MÜLLER and TROSCHEL. 225 mm. No. 1818. 3. *Brycon siebenthala* EIGENMANN. (Type.) 204 mm. No. 1819.



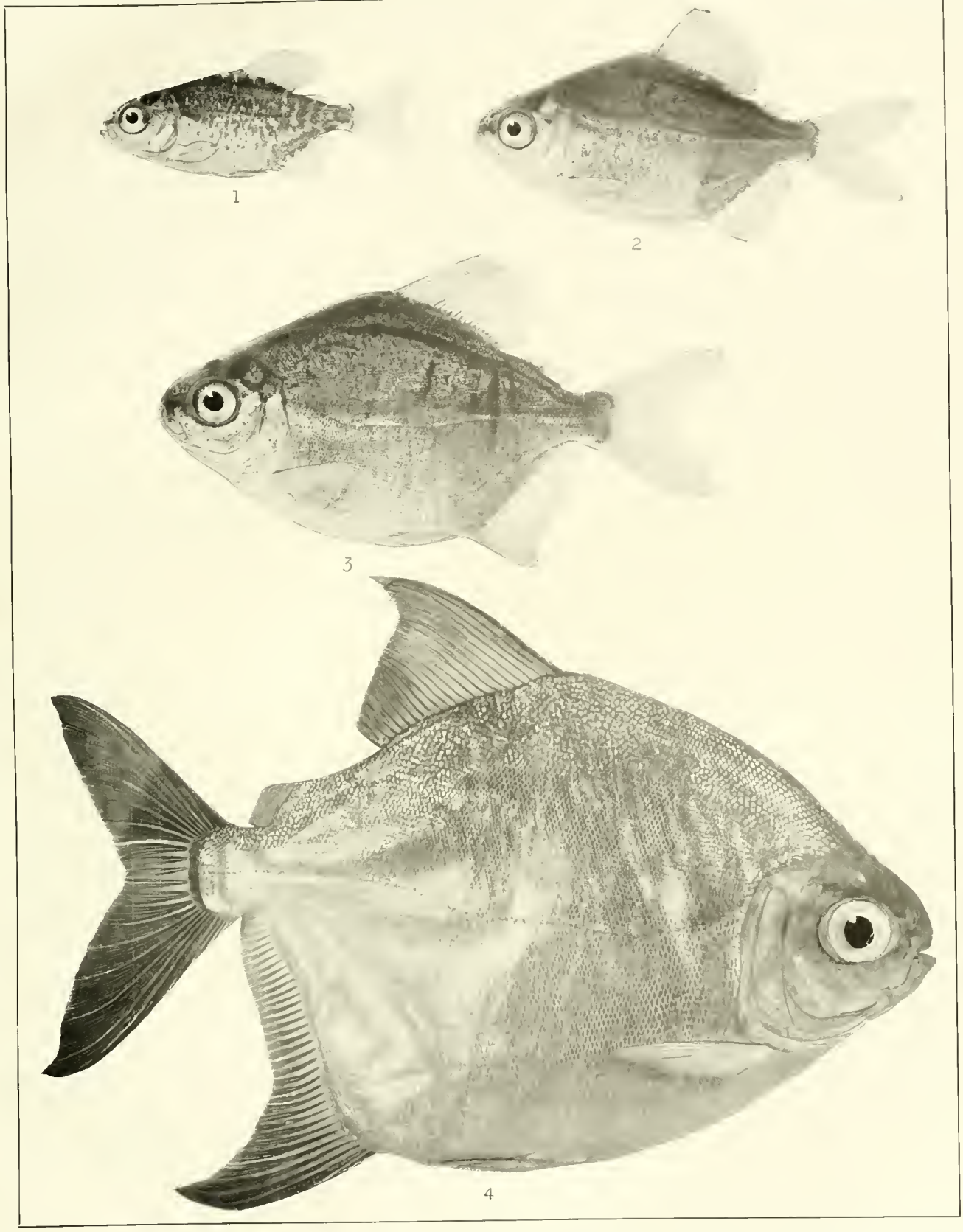
1. *Chalcinus rotundatus* (SCHOMBURGK). 186 mm. No. 2059*a*. 2. *Carnegiella strigata* (GÜNTHER). 41 mm. No. 1296. 3. *Carnegiella strigata* (GÜNTHER). 41 mm. No. 1296. 4. *Gasteropelecus sternicla* (LINNÆUS). 65 mm. No. 1101.



1. *Serrasalmo rhombeus* (LINNÆUS). 56 mm. No. 1741. 2. *Pygocentrus bilineatus* EIGENMANN. (Cotype.) 56 mm. I. U. No. 11,757. 3. *Catoprion mento* (CUVIER). 79 mm. No. 1740.

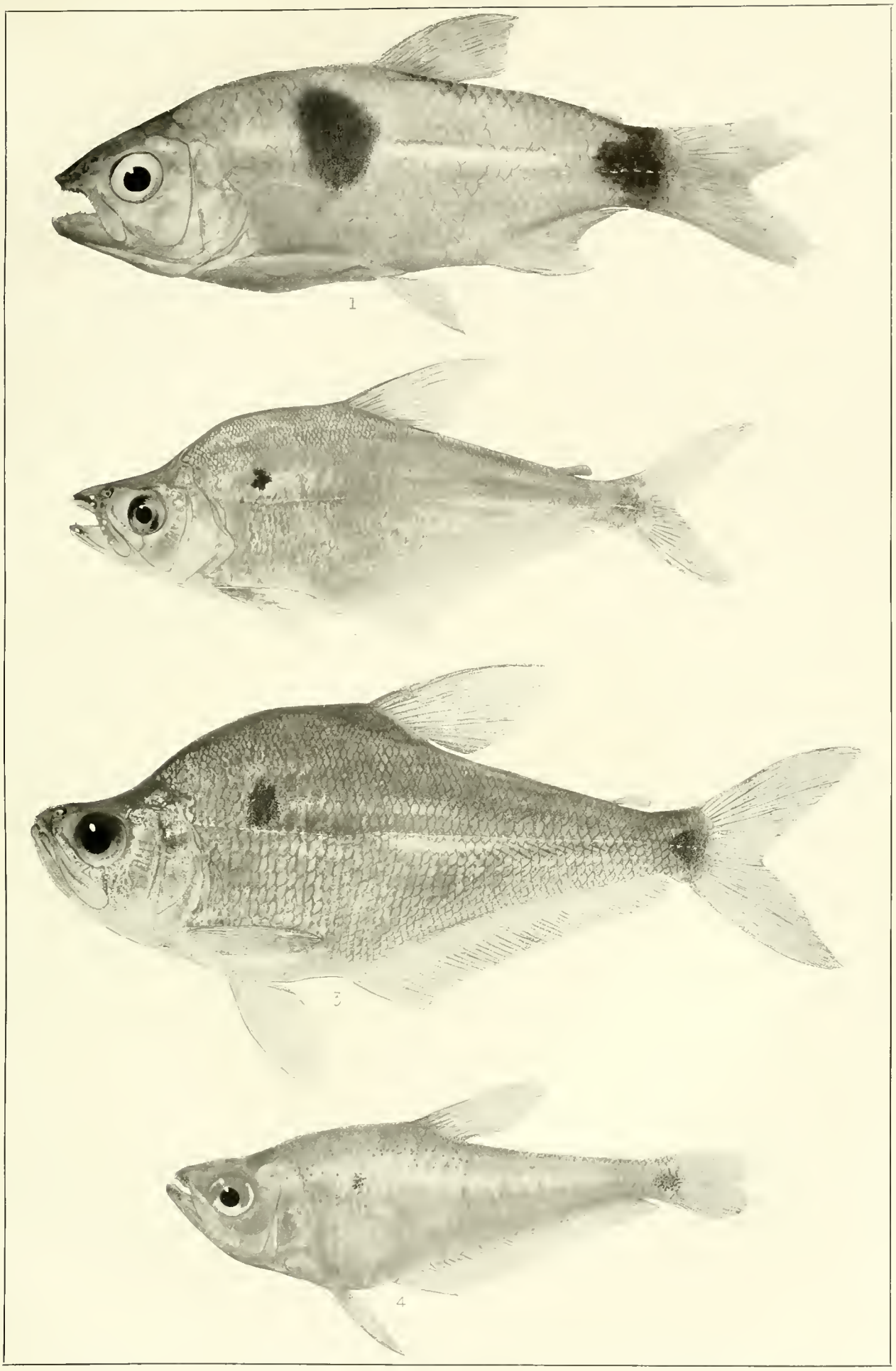


1. *Metynnis maculatus* (KNER). 65 mm. No. 2216. 2. *Myloplus rubripinnis* (MÜLLER and TROSCHEL). 165 mm. No. 1129. 3. *Myloplus asterias* (MÜLLER and TROSCHEL), ♂.

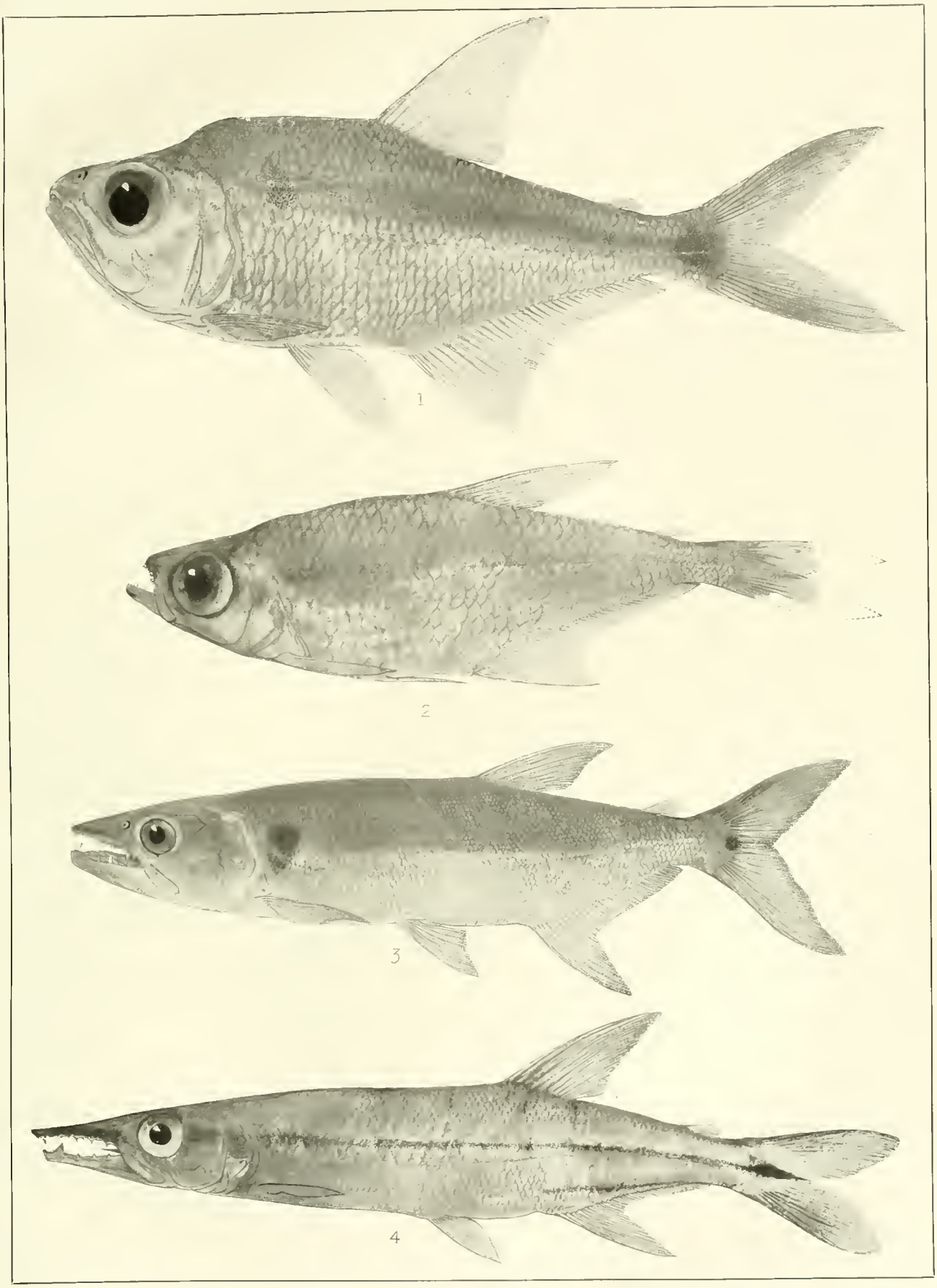


Myloplus rhomboidalis (CUVIER). 1. 22 mm. No. 2219*a*. 2. 31.5 mm. No. 2219*b*. 3. 40 mm. No. 2219*c*. 4. 219 mm. No. 1490.

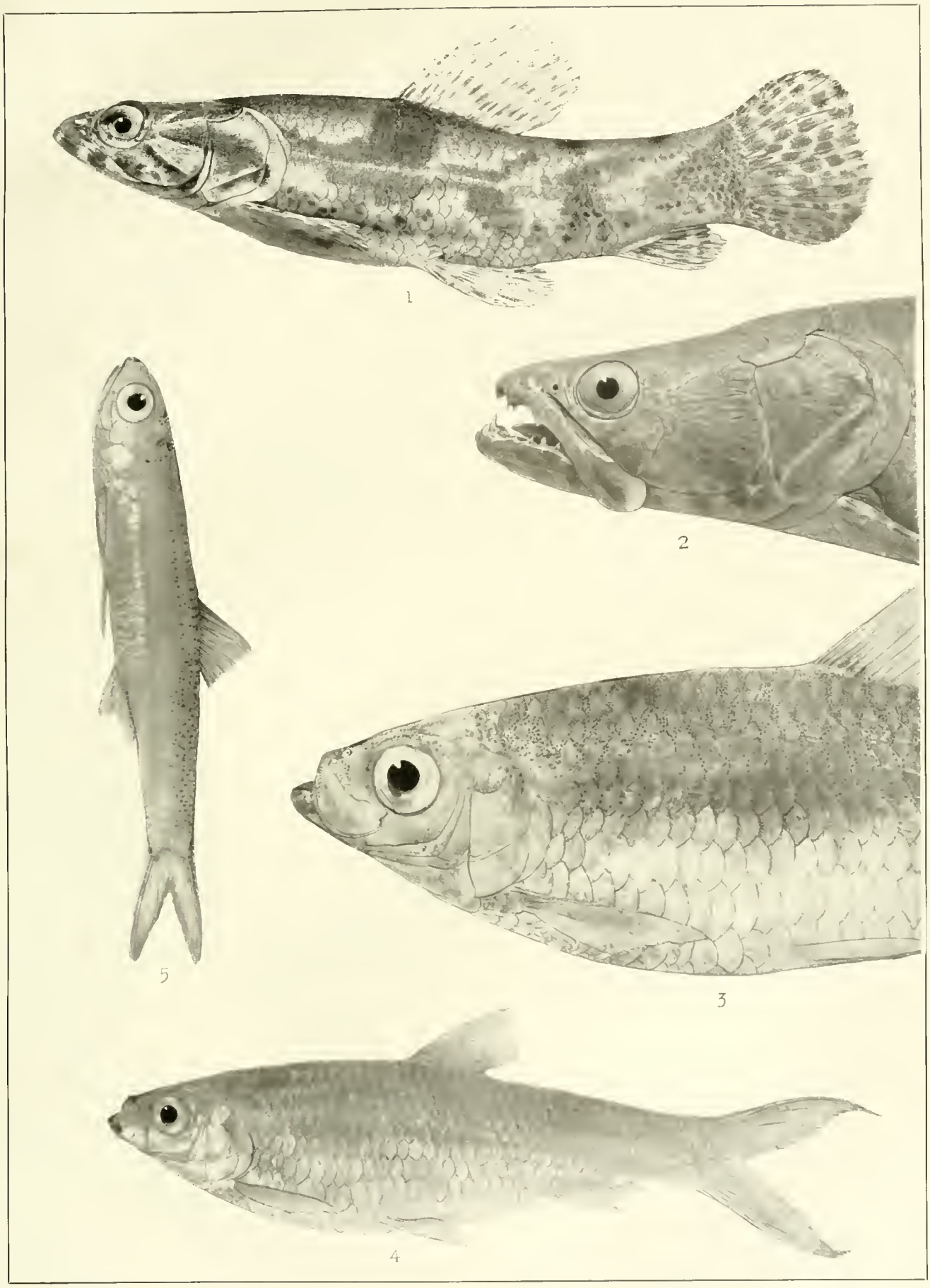
Myleus pacu (SCHOMBURGK). 1. Young, 22 mm., No. 2220*a*. 2. Young, 27 mm., No. 2220*b*. 3. Young, 55 mm., No. 2220*c*. 4. Young, 55 mm., No. 2220*d*. 5. Tail of adult ♂; entire length, 535 mm., No. 2492. 6. Adult ♀, 515 mm., No. 2491.



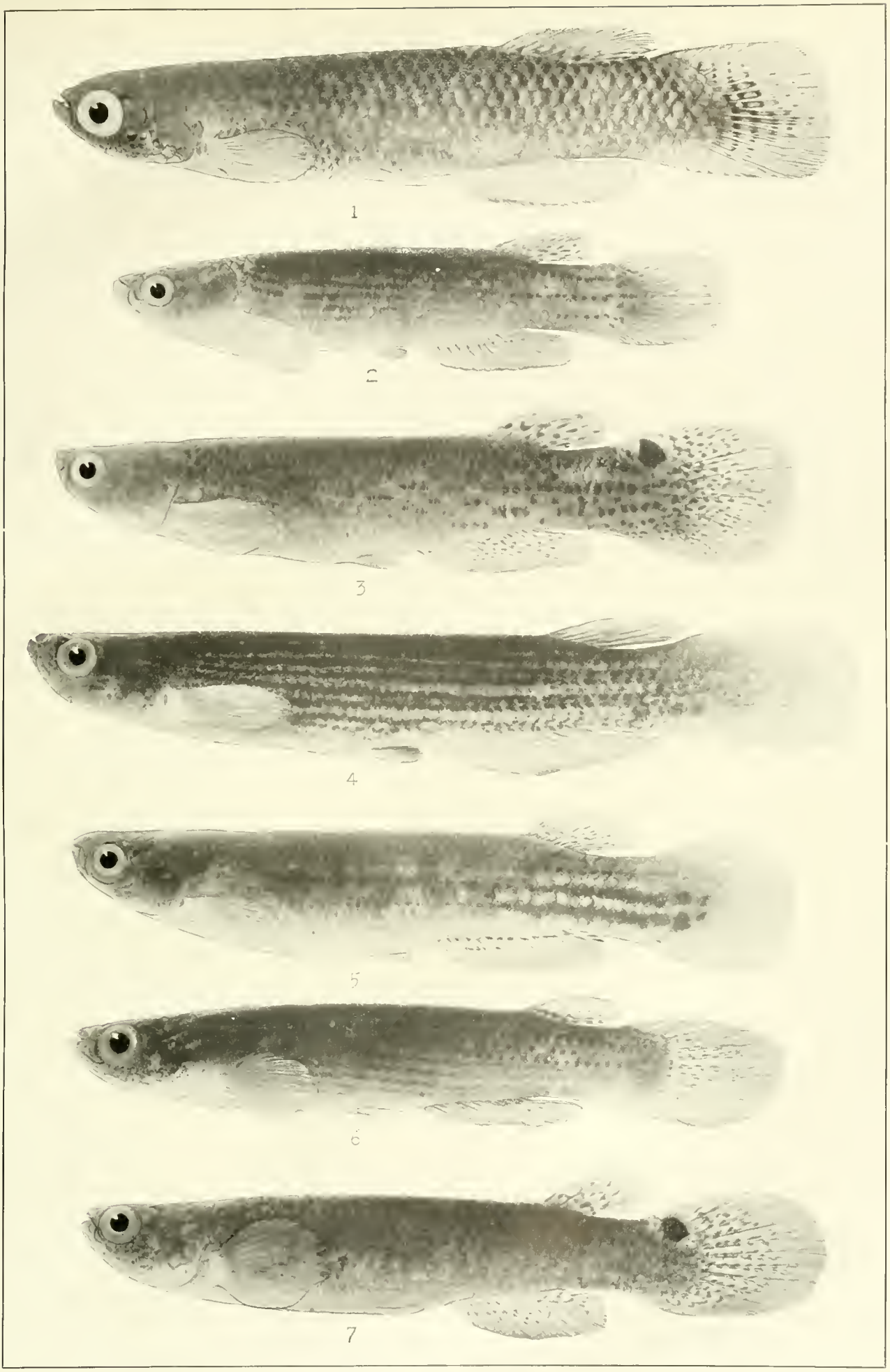
1. *Exodon paradoxus* MÜLLER and TROSCHEL. 75 mm. No. 2145. 2. *Raboides thurni* EIGENMANN. (Type.) 104 mm. No. 2149. 3. *Charax gibbosus* (LINNÆUS). 87 mm. No. 2130. 4. *Asiphonichthys hemigrammus* EIGENMANN. (Type.) 27 mm. No. 2137.



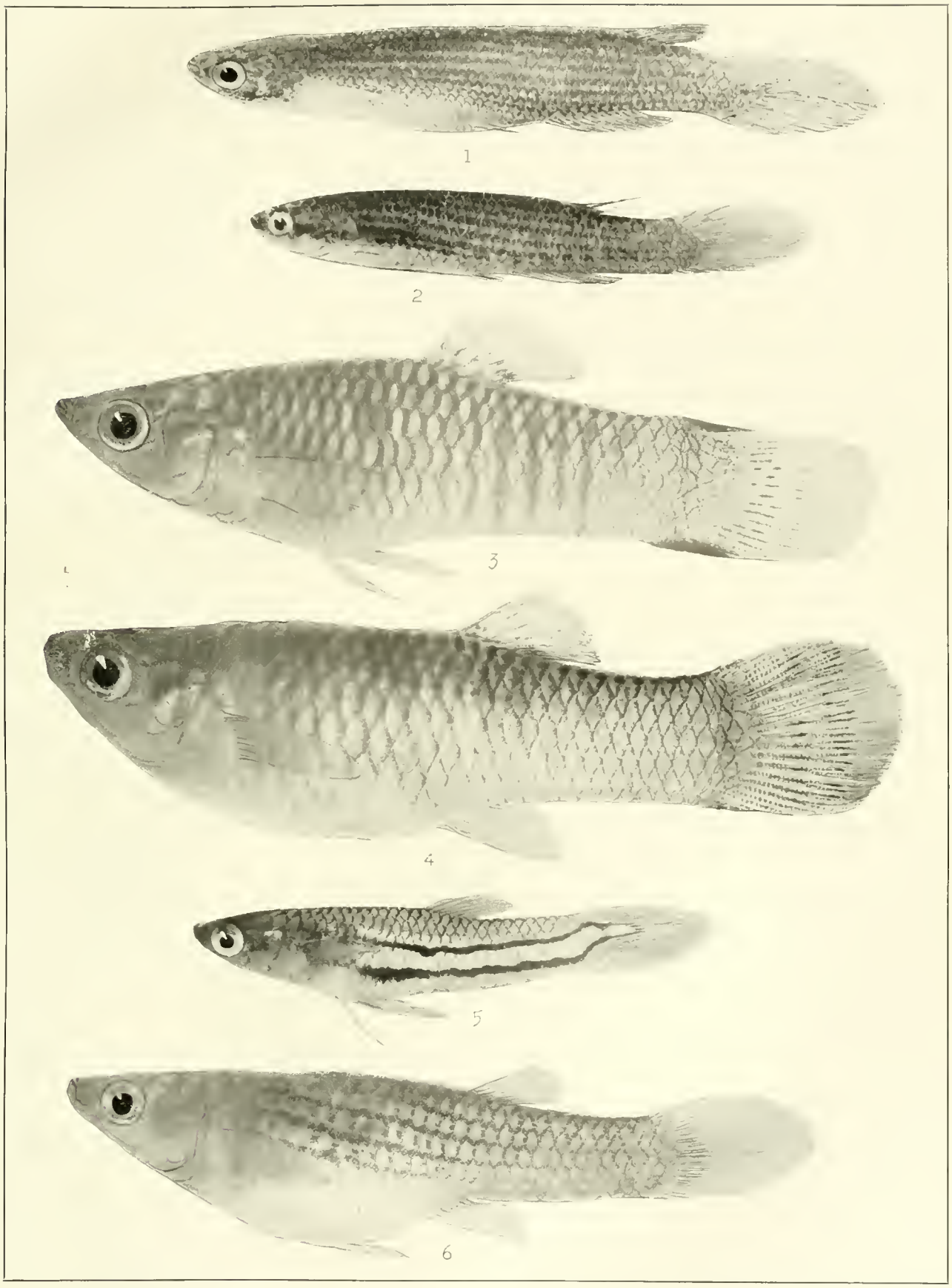
1. *Acanthocharax microlepis* EIGENMANN. (Type.) 105 mm. No. 2138. 2. *Heterocharax macrolepis* EIGENMANN. (Type.) 46 mm. No. 2142. 3. *Acestrorhynchus falcatus* (BLOCH). 179 mm. No. 1960. 4. *Acestrorhynchus nasutus* EIGENMANN. (Type.) 79 mm. No. 1959.



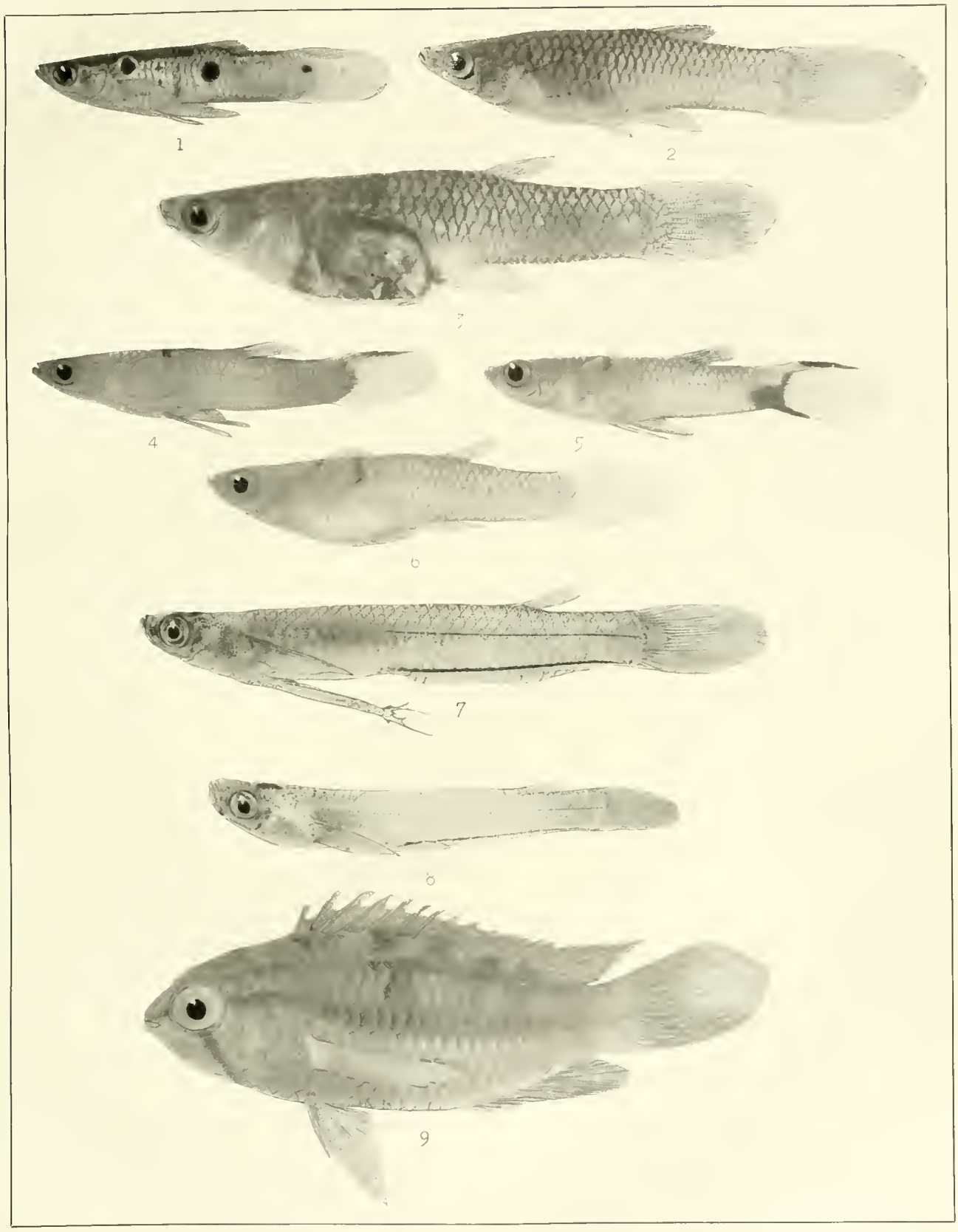
1. *Hoplias macrophthalmus* (PELLEGRIN). 191 mm. No. 2174. 2. *Hoplias malabaricus* (BLOCH). 195 mm. 1. U. No. 10,252. 3. *Rhinosardinia serrata* EIGENMANN. (Type.) 85 mm. No. 2443. 4. *Rhinosardinia serrata* EIGENMANN. 85 mm. No. 2443. 5. *Stoleferus guianensis* EIGENMANN. (Type.) 38 mm. No. 2448*a*.



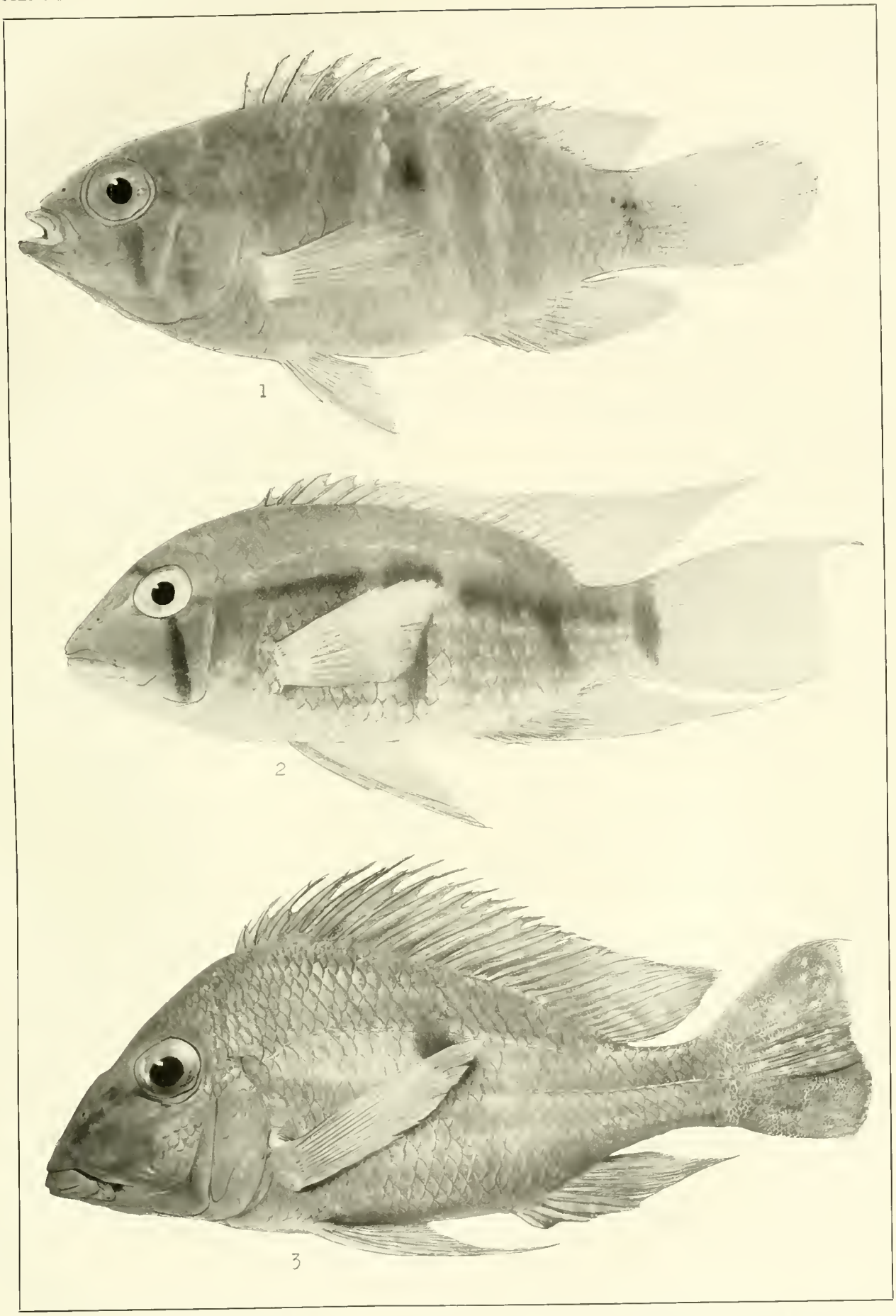
1. *Rivulus breviceps* EIGENMANN. (Type.) 50 mm. No. 1075. 2. *Rivulus holmiæ* EIGENMANN, ♂. (Cotype.) 63 mm. No. 1077. 3. *Rivulus holmiæ* EIGENMANN, ♀. (Type.) 77 mm. No. 1076. 4. *Rivulus waimacui* EIGENMANN, ♂. (Cotype.) 88 mm. No. 1079. 5. *Rivulus waimacui* EIGENMANN, ♀. (Type.) 79 mm. No. 1078. 6. *Rivulus stagnatus* EIGENMANN, ♂. (Cotype.) 12 mm. No. 1083. 7. *Rivulus stagnatus* EIGENMANN, ♀. (Type.) 44 mm. No. 1082.



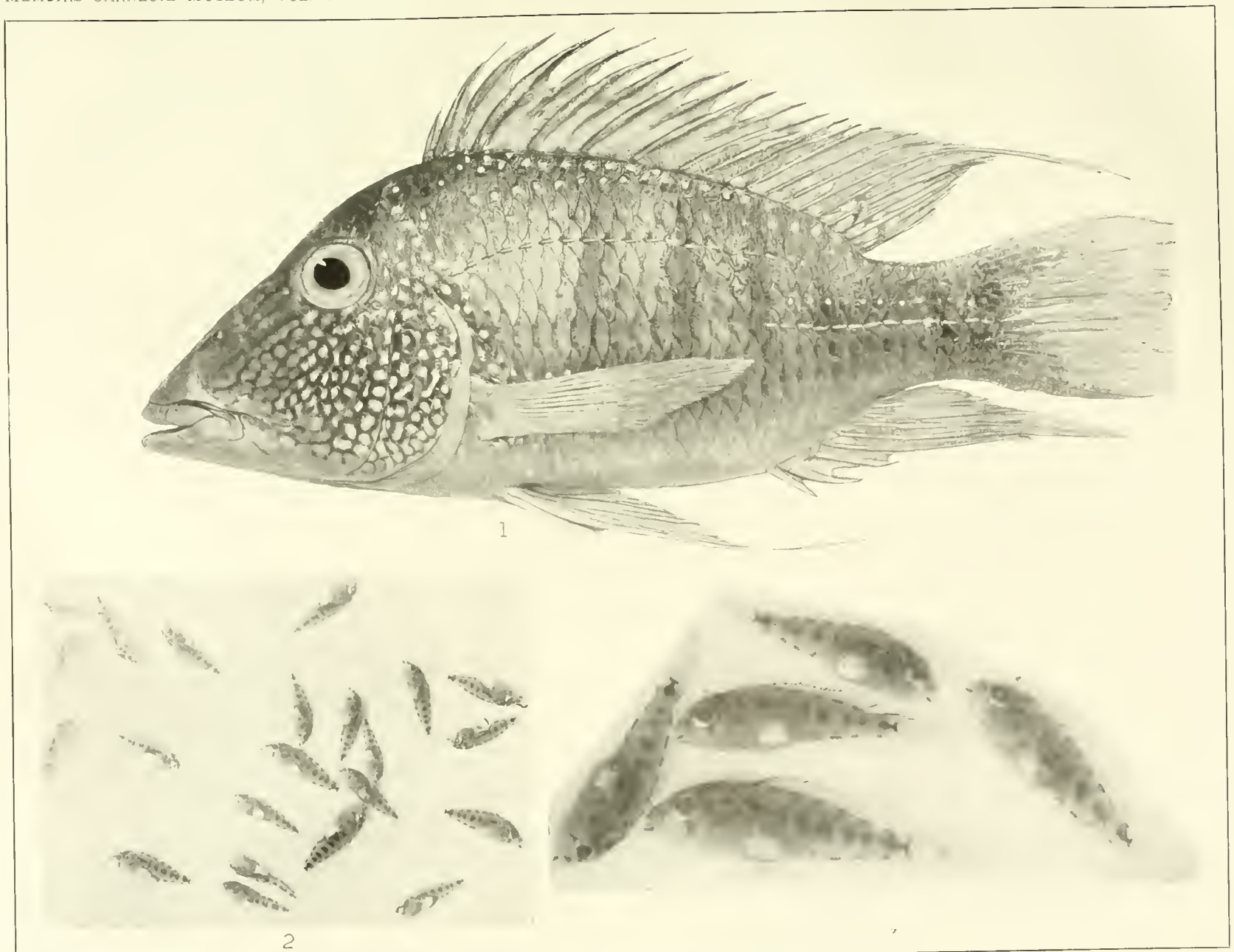
1. *Rivulus lanceolatus* EIGENMANN. (Type.) 42.5 mm. No. 1082. 2. *Rivulus frenatus* EIGENMANN. (Type.) 28 mm. No. 1085. 3. *Pœcilia vivipara* BLOCH and SCHNEIDER, ♂. 49 mm. No. 1427*a*. 4. *Pœcilia vivipara* BLOCH and SCHNEIDER, ♀. 53 mm. No. 1427*b*. 5. *Acanthophacelus melanzonus* EIGENMANN, ♂. (Type.) 27 mm. No. 1086. 6. *Acanthophacelus melanzonus* EIGENMANN, ♀. (Cotype.) 39 mm. No. 1087.



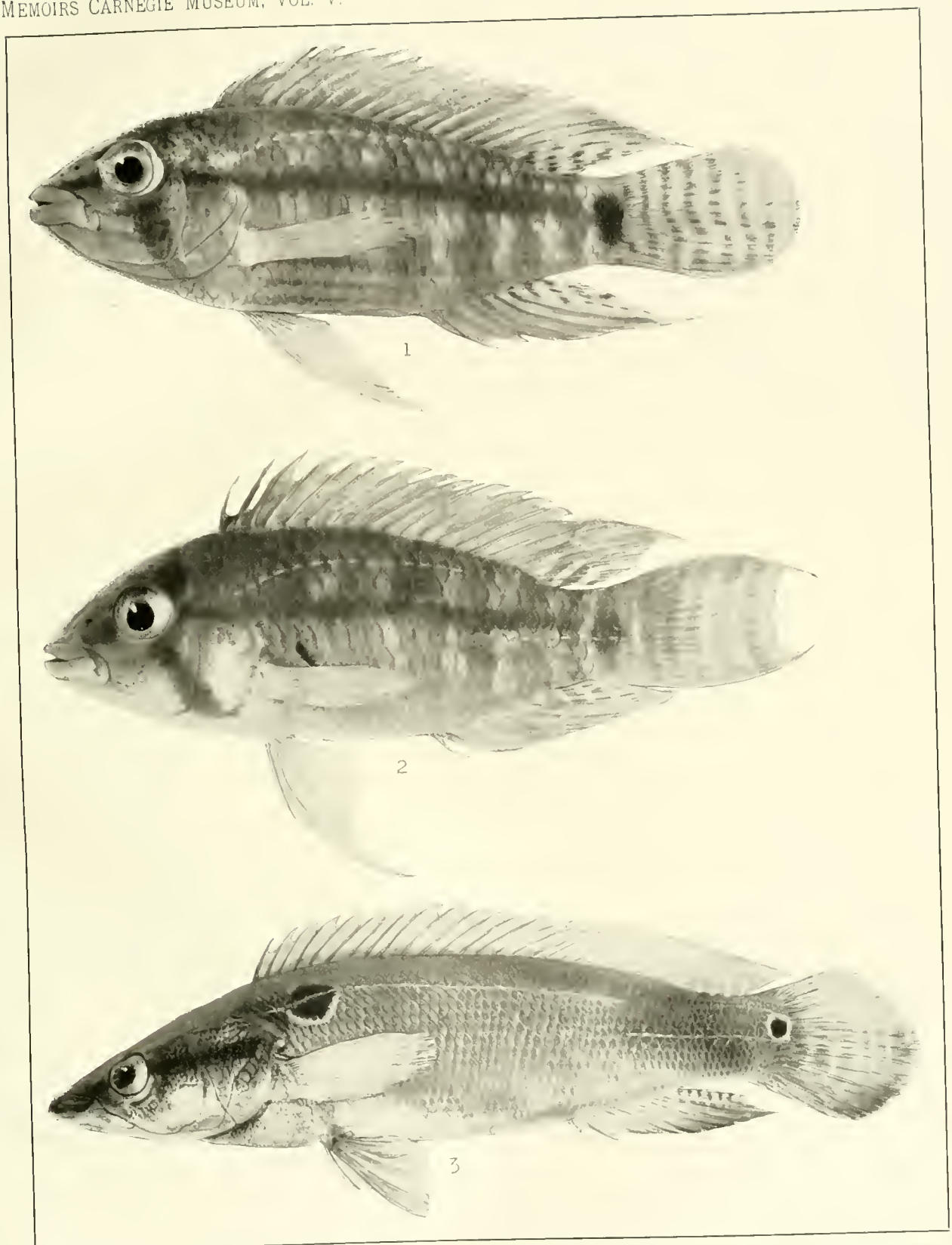
1. *Acanthophacelus reticulatus* (PETERS). ♂. 26 mm. No. 1429*a*. 2. Do., ♀. 32 mm. No. 1429*b*. 3. Do. 39 mm. No. 1429*c*. 4. *Acanthophacelus bifurcus* EIGENMANN, ♂. (Cotype.) 22 mm. No. 1090*a*. 5. Do. (Cotype), ♂. 21 mm. No. 1090*b*. 6. Do. (Cotype), ♀. 26 mm. No. 1089. 7. *Tomeurus gracilis* EIGENMANN, ♂. (Type.) 31 mm. No. 1093. 8. Do. (Cotype), ♀. 28 mm. No. 1094. 9. *Nannachara anomala* REGAN. 23 mm. No. 2303.



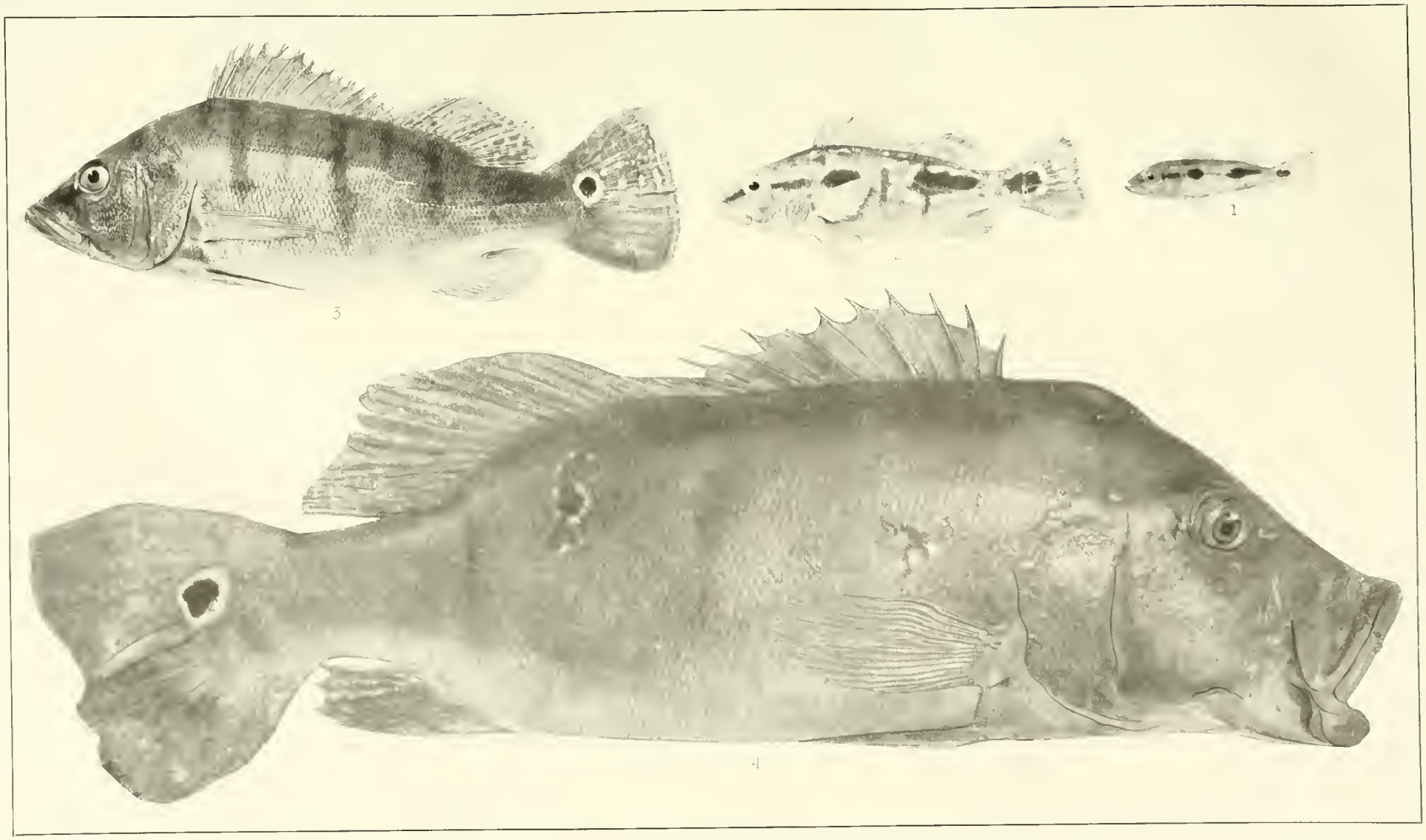
1. *Nannachara bimaculata* EIGENMANN. (Type.) 57 mm. No. 2304. 2. *Æquidens potarocnsis* EIGENMANN. (Type.) 140 mm. No. 2407. 3. *Geophagus surinamensis* (BLOCH). 175 mm. No. 2324.



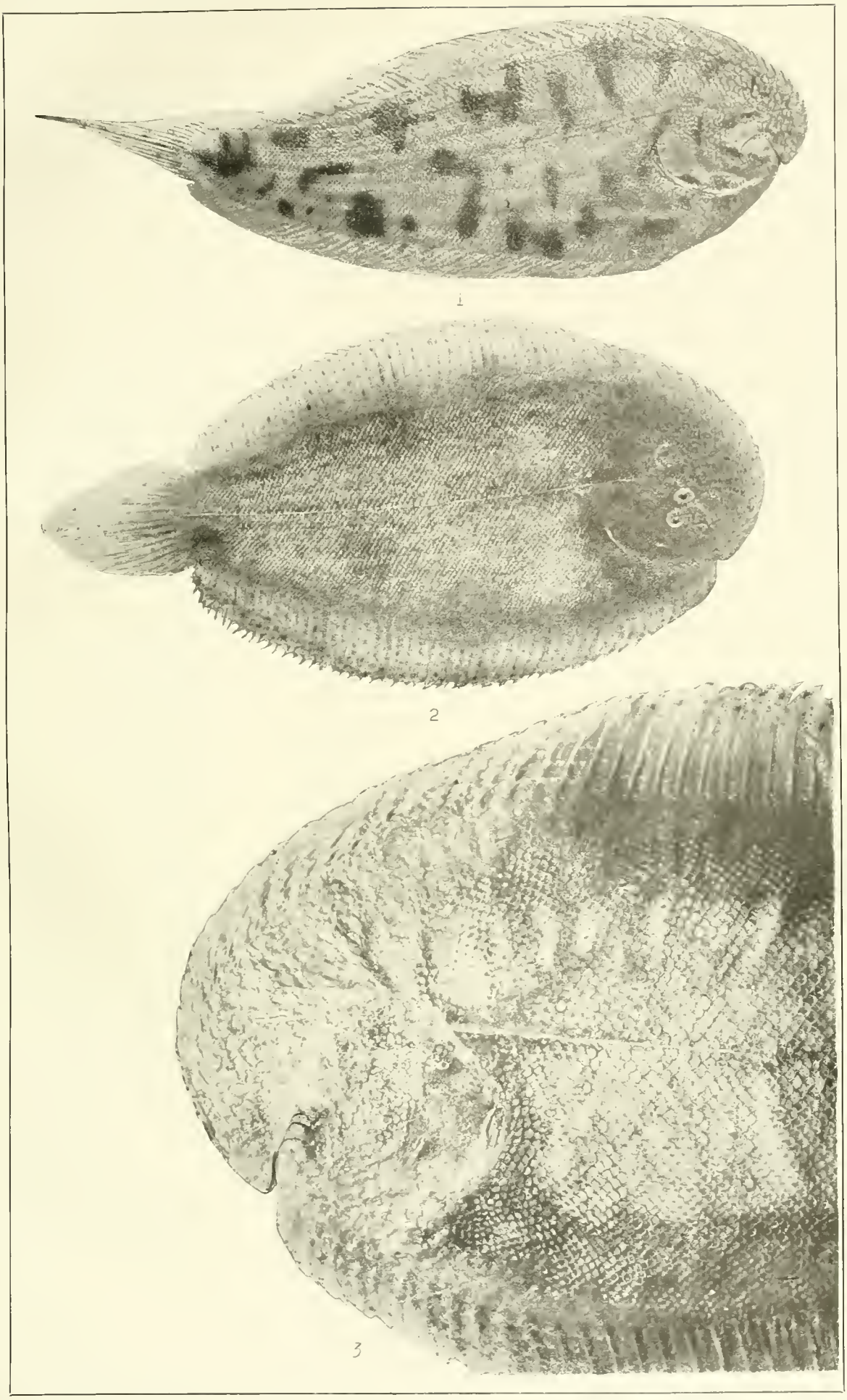
1. *Geophagus jurupari* HECKEL. 200 mm. I. U. 12,483. 2. Group of young, about two-thirds natural size. 3. Group of young of same, enlarged.



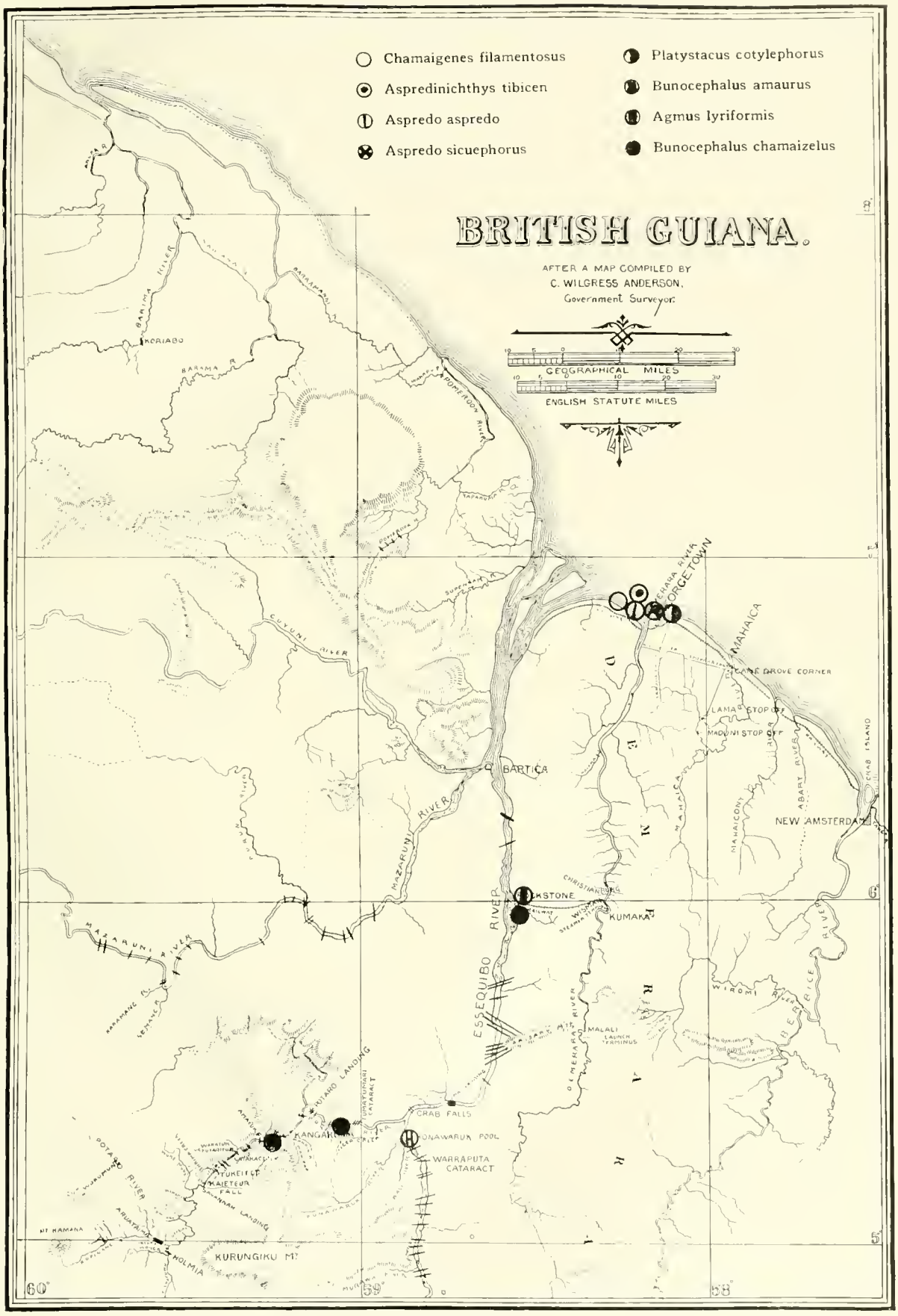
1. *Heterogramma ortmanni* EIGENMANN. (Type.) 64 mm. No. 2306. 2. *Heterogramma steindachneri* REGAN. 67 mm. No. 2318. 3. *Crenicichla alta* EIGENMANN. (Type.) 170 mm. No. 2274.



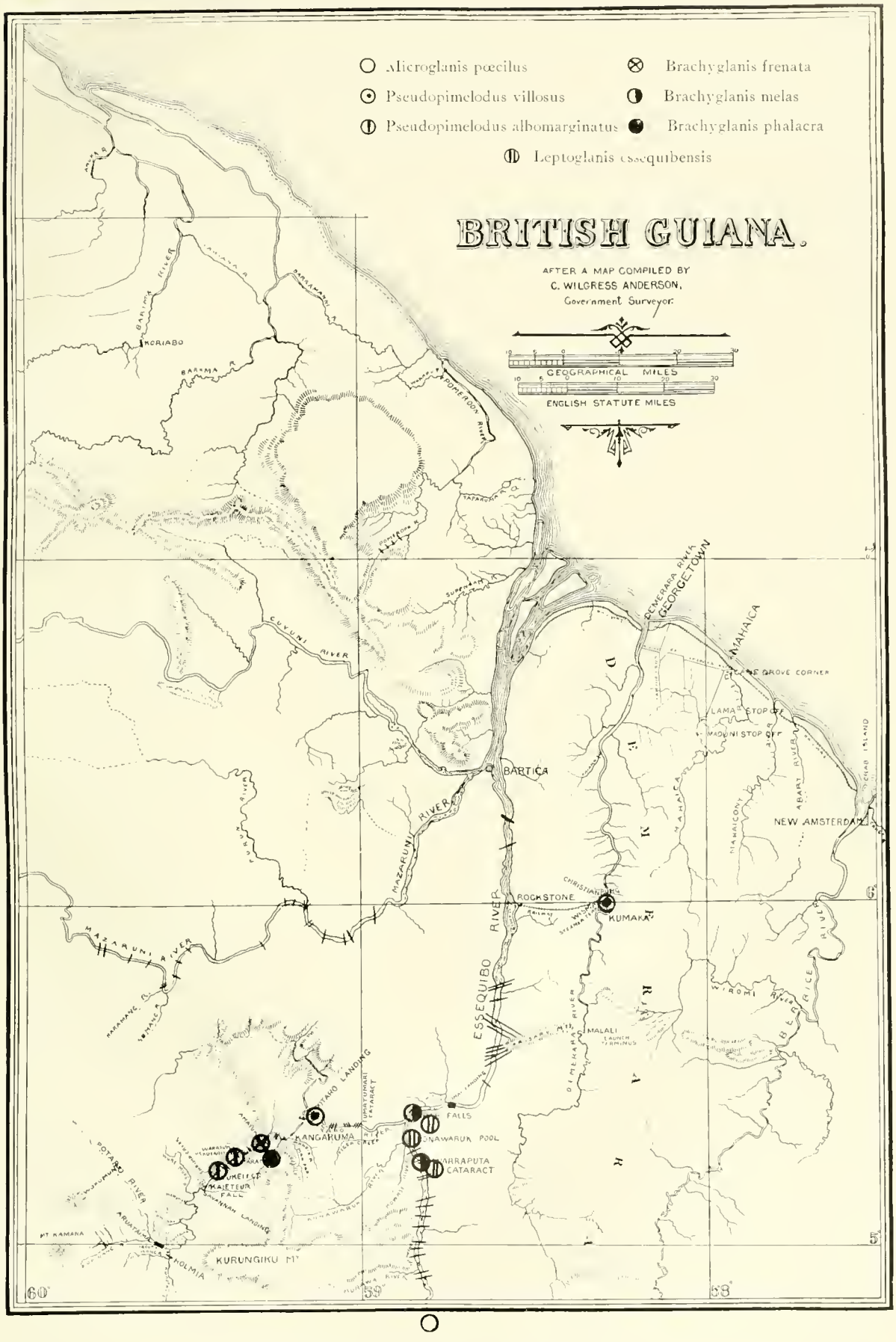
Cichla ocellaris BLOCH and SCHNEIDER. 1. Young, 50 mm., No. 2281. 2. Young, 138 mm., No. 2279. 3. Half-grown, 249 mm., No. 2275. 4. Adult, 660 mm. From photograph taken in the field.



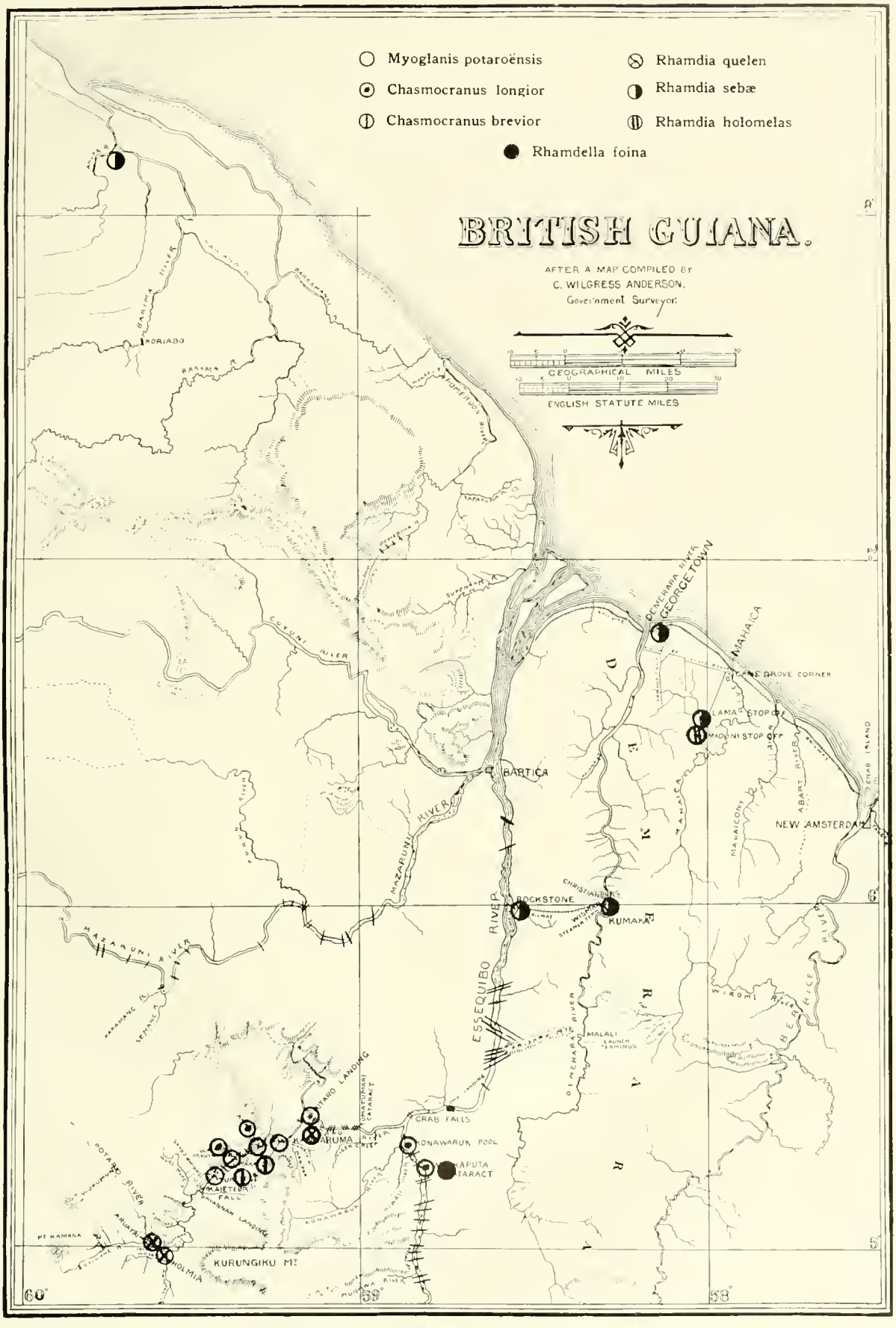
1. *Apionichthys unicolor* GÜNTHER. 71 mm. No. 2412. 2. *Solconasus finis* EIGENMANN. (Type.) 80 mm. No. 2487. 3. Left side of individual given in Figure 2, enlarged.



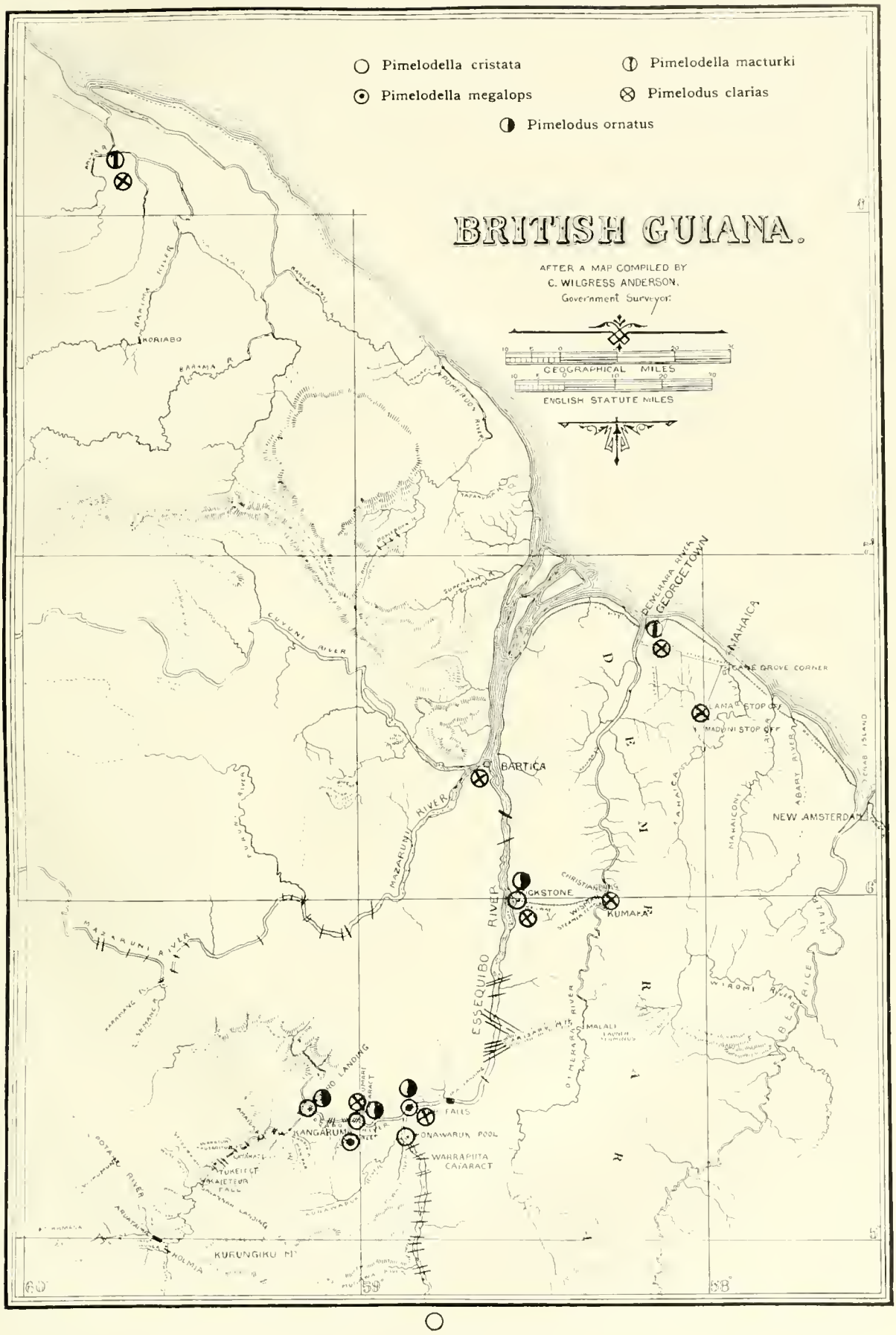
Distribution of the Aspredinidæ.



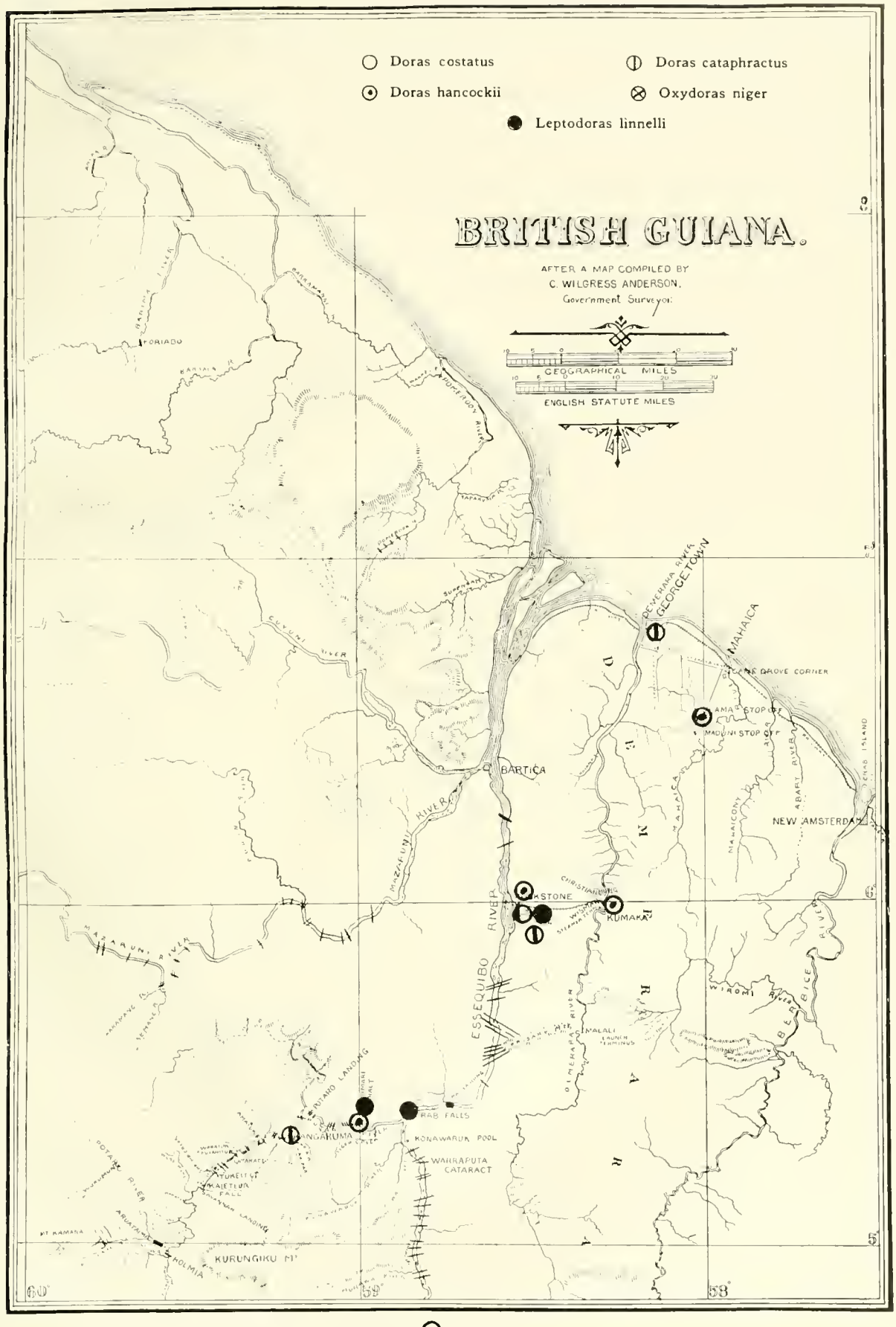
DISTRIBUTION OF THE PIMELODINÆ.



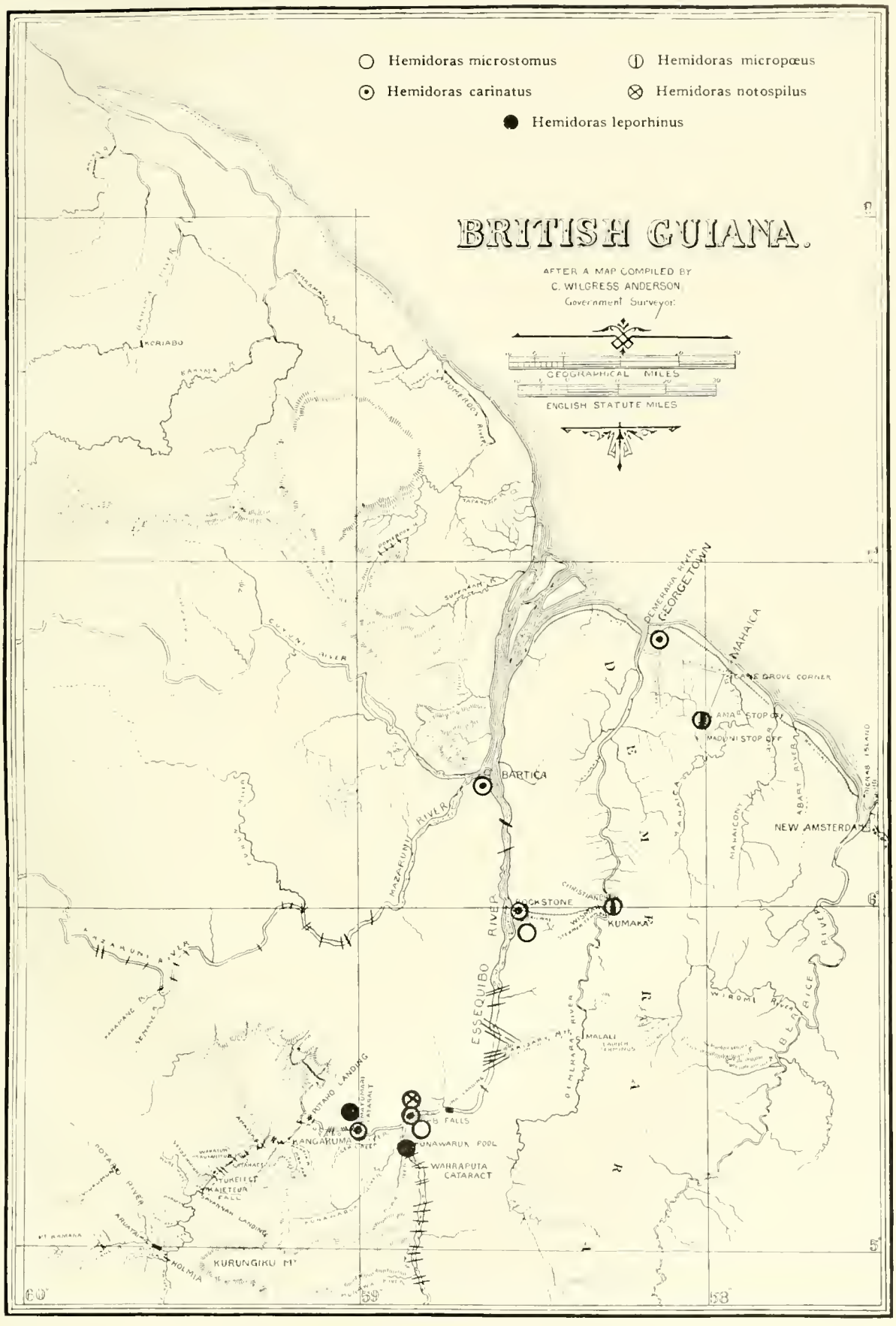
DISTRIBUTION OF THE PIMELODINÆ (*continued*).



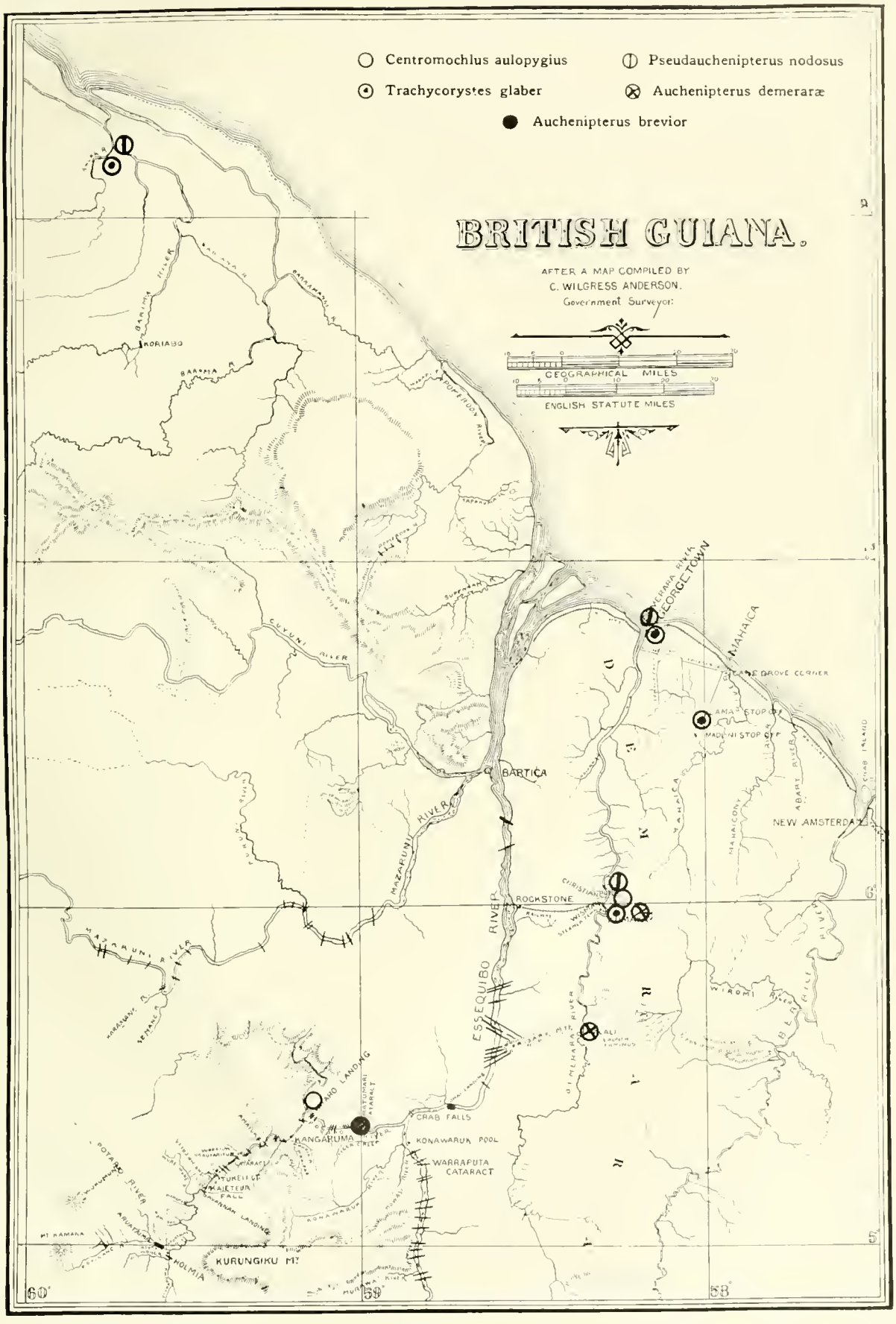
DISTRIBUTION OF THE PIMELODINÆ (*continued*).



DISTRIBUTION OF THE DORADINÆ.



DISTRIBUTION OF THE DORADINÆ (*continued*).



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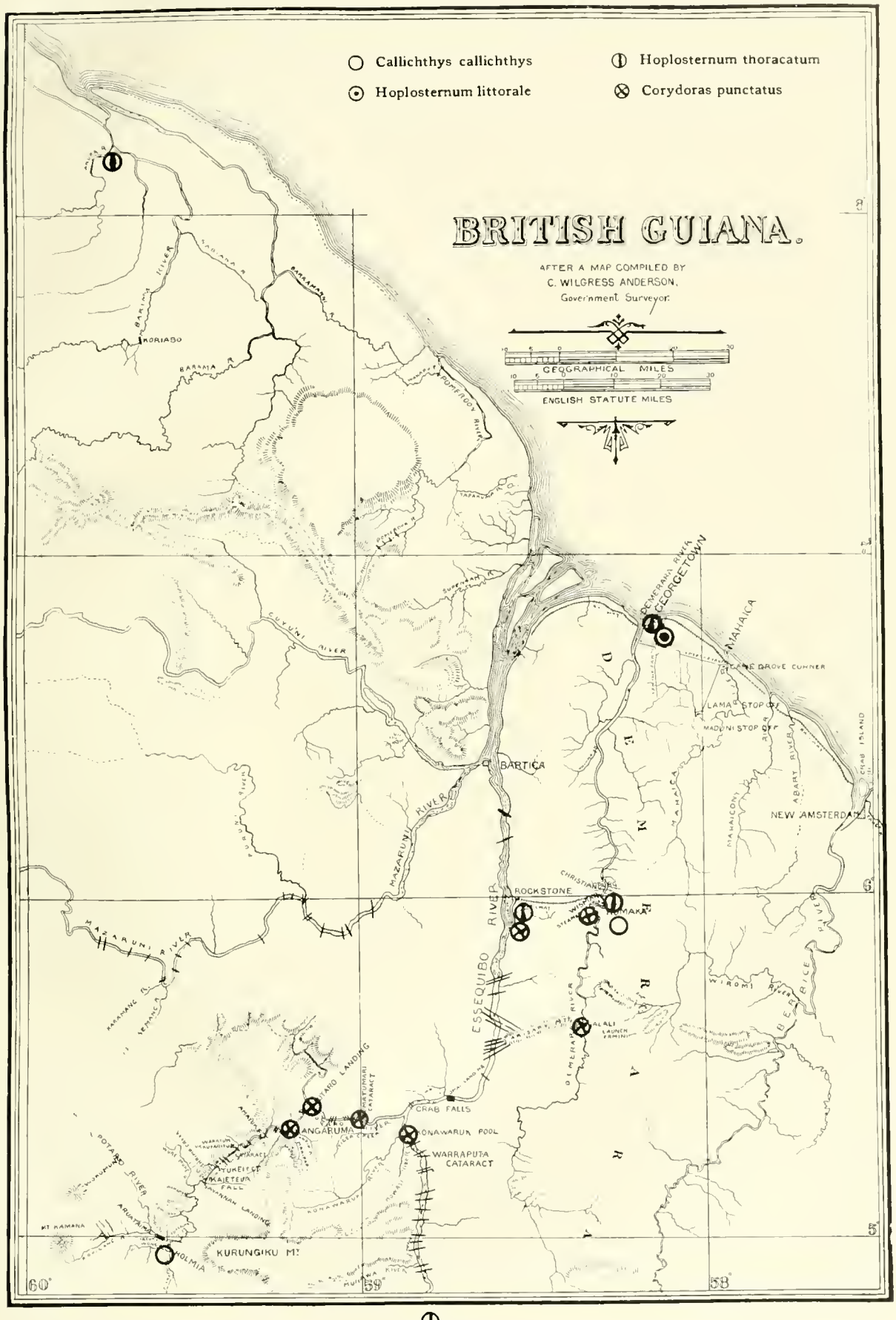

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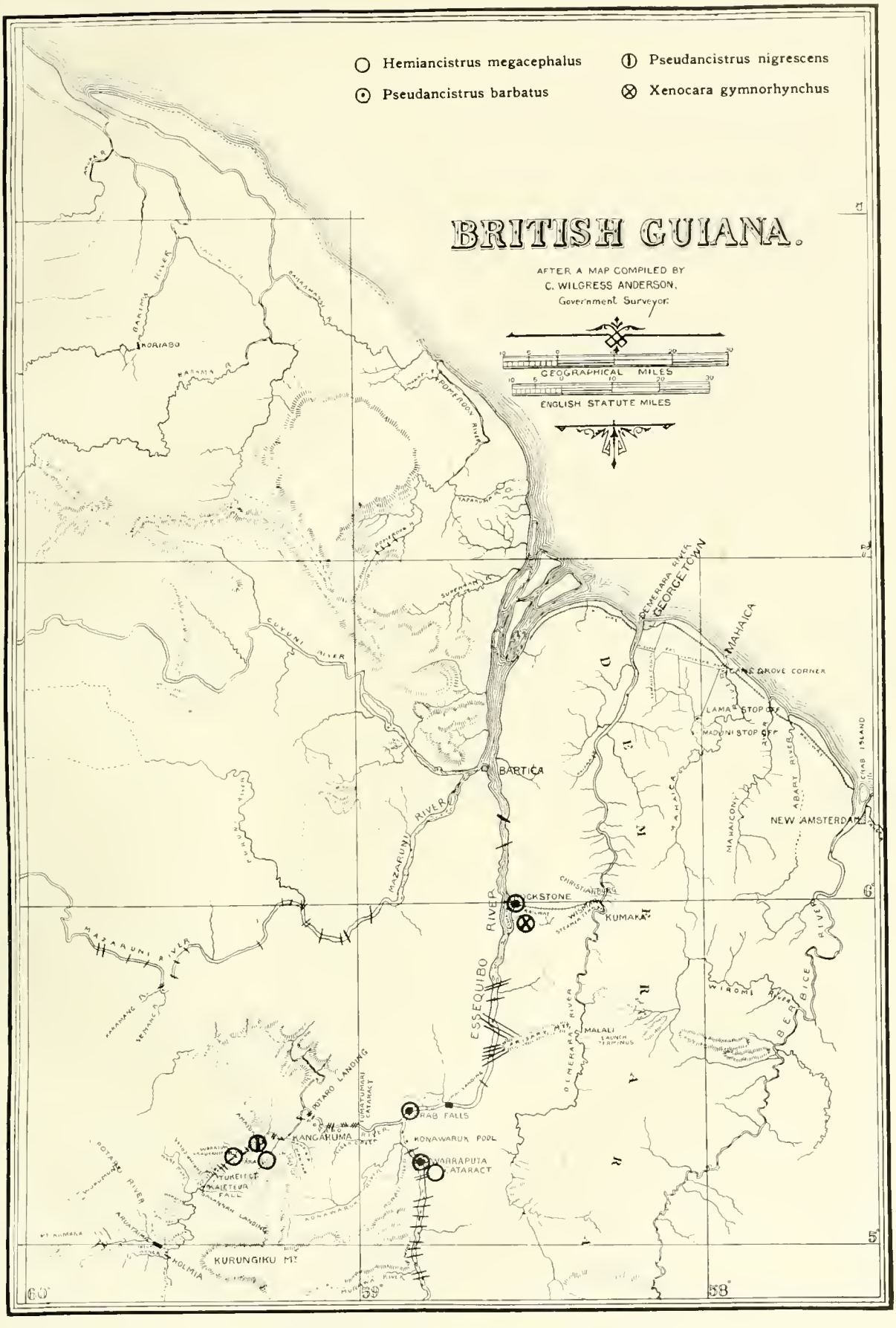

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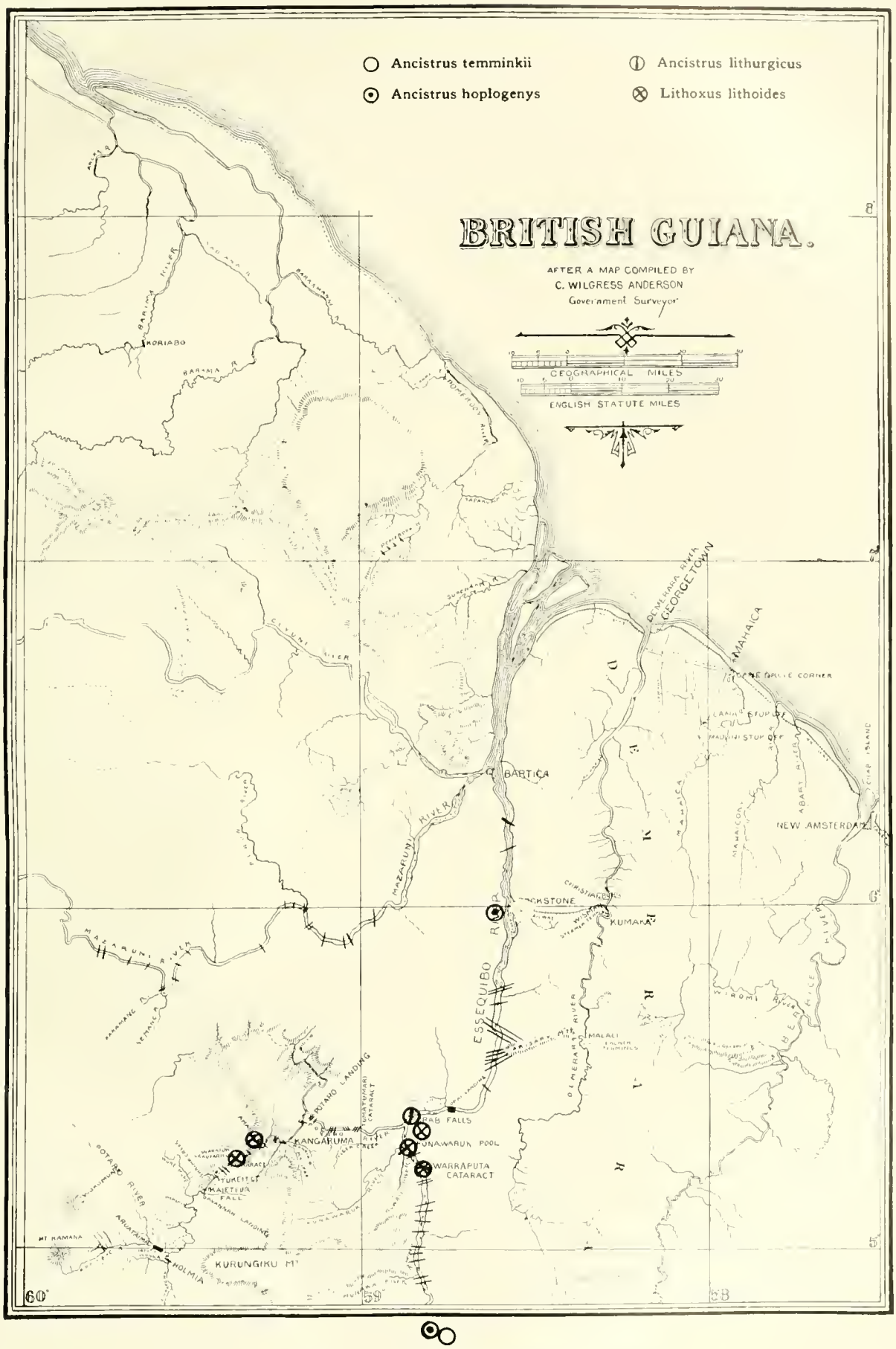

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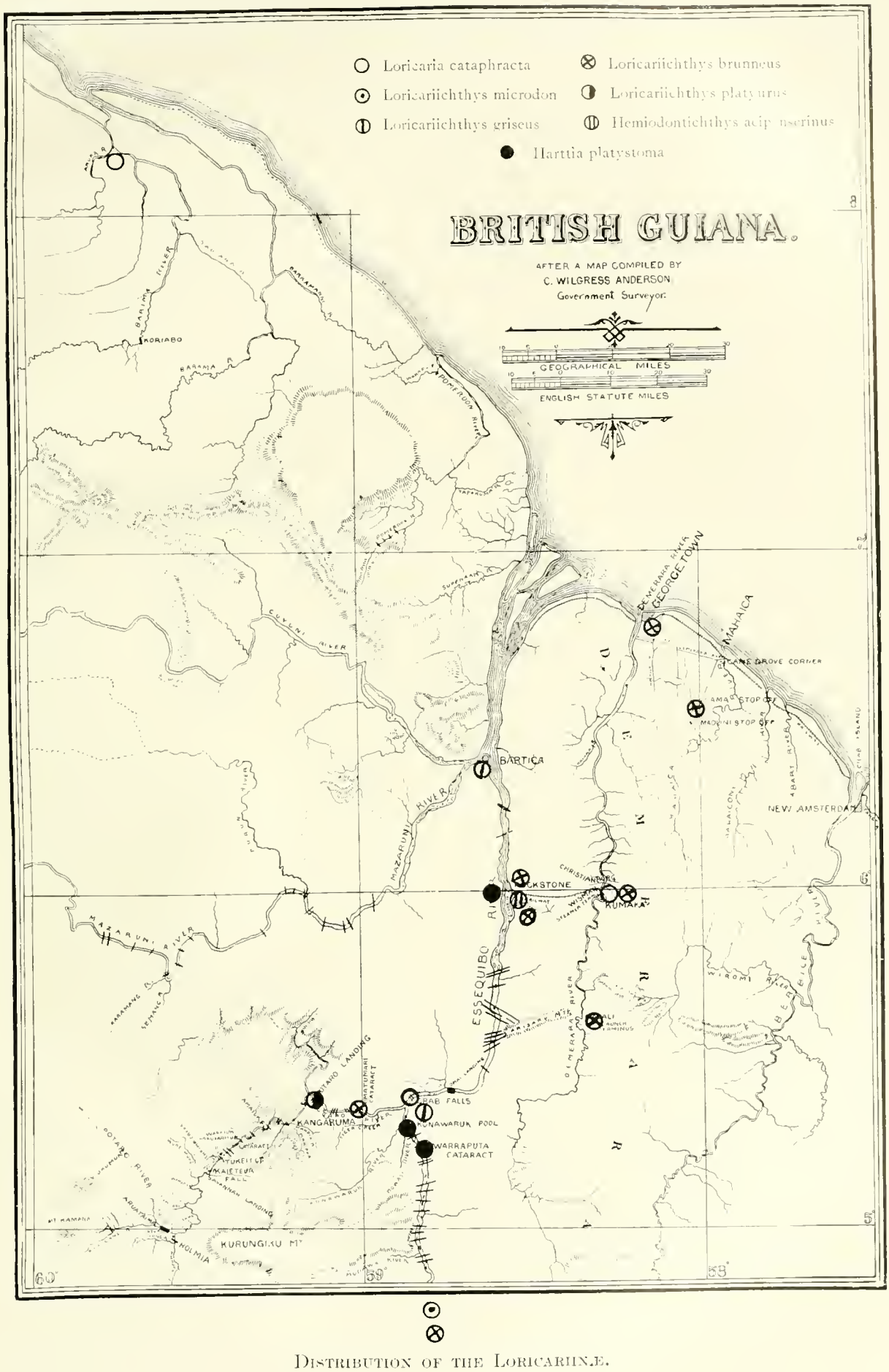

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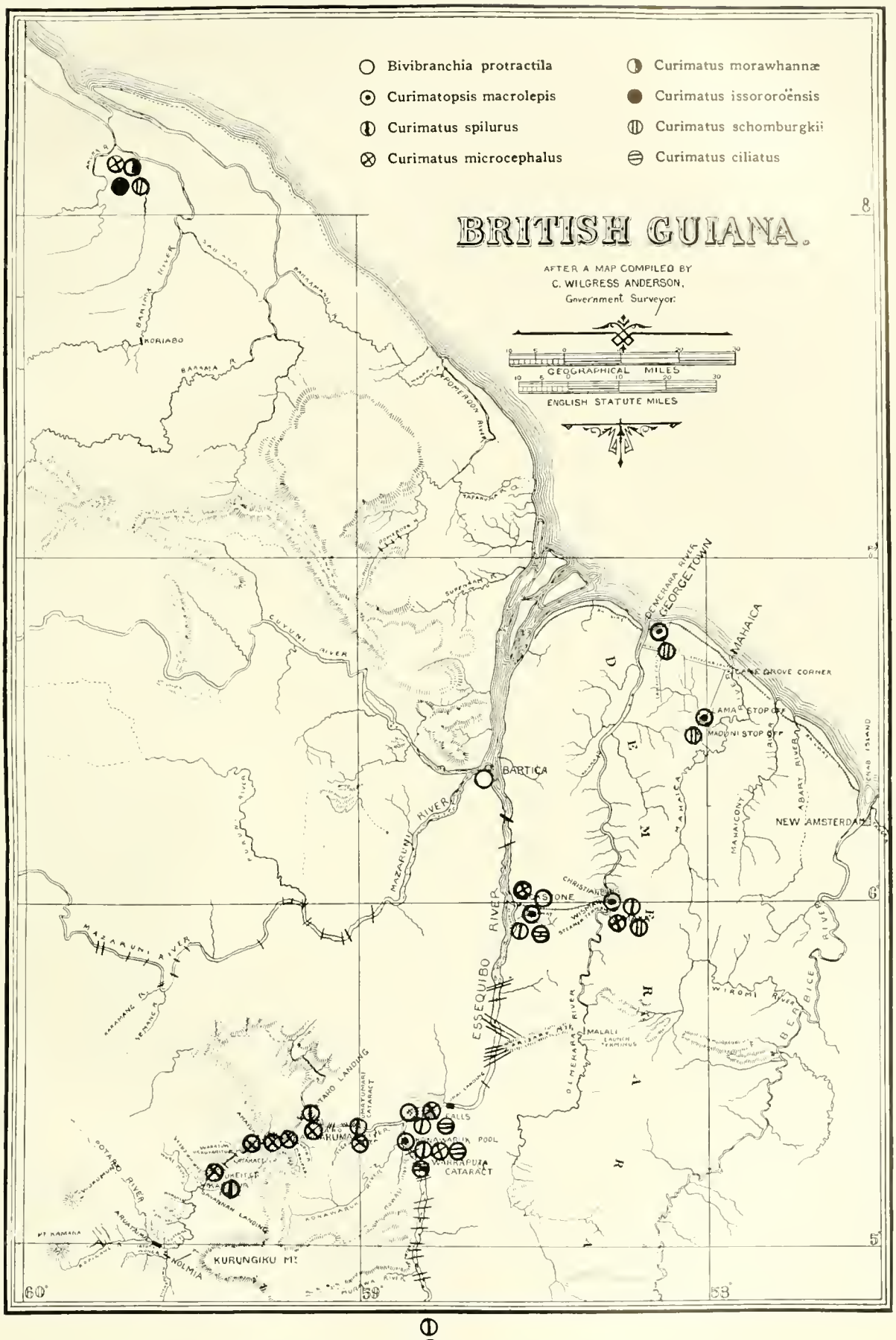

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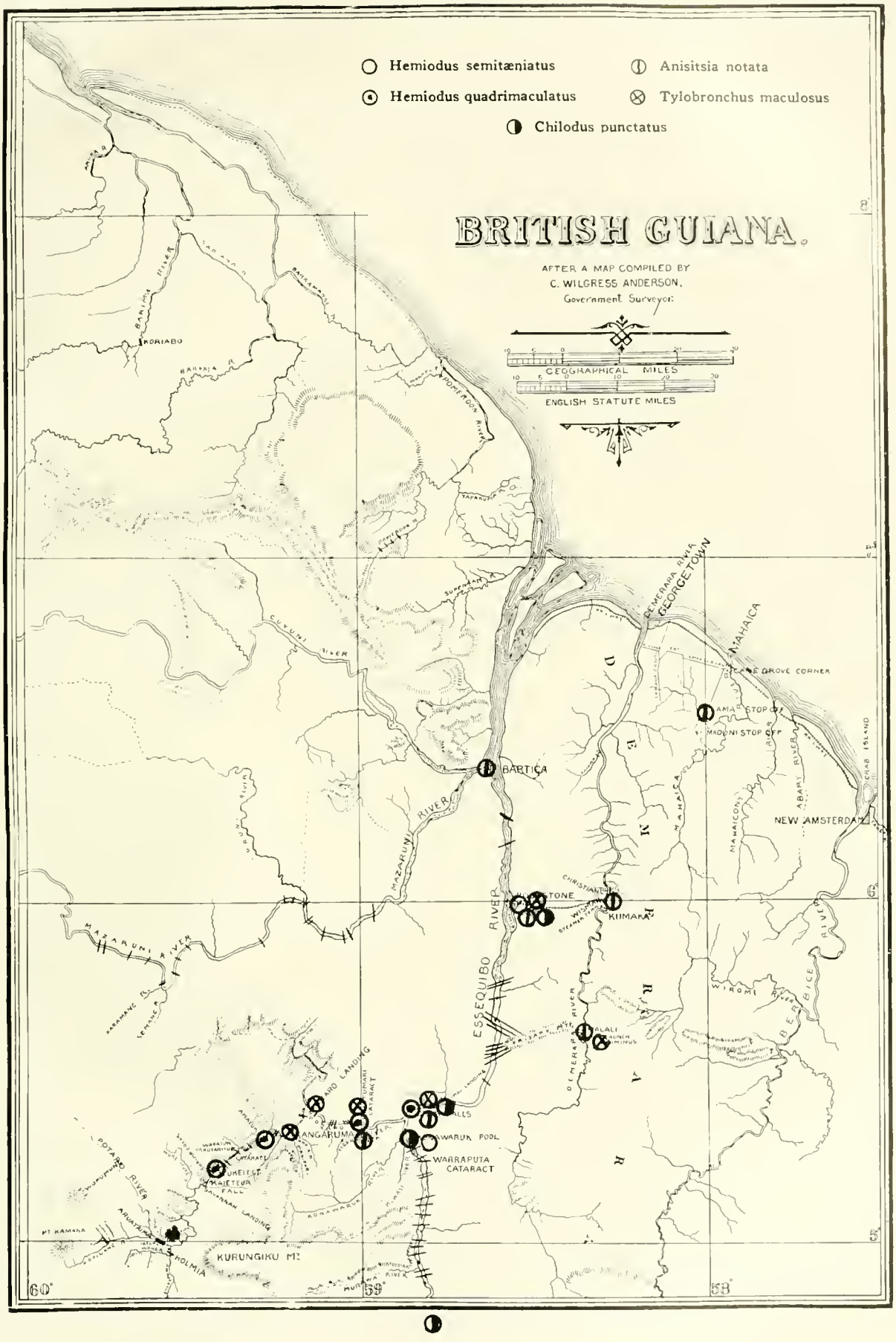

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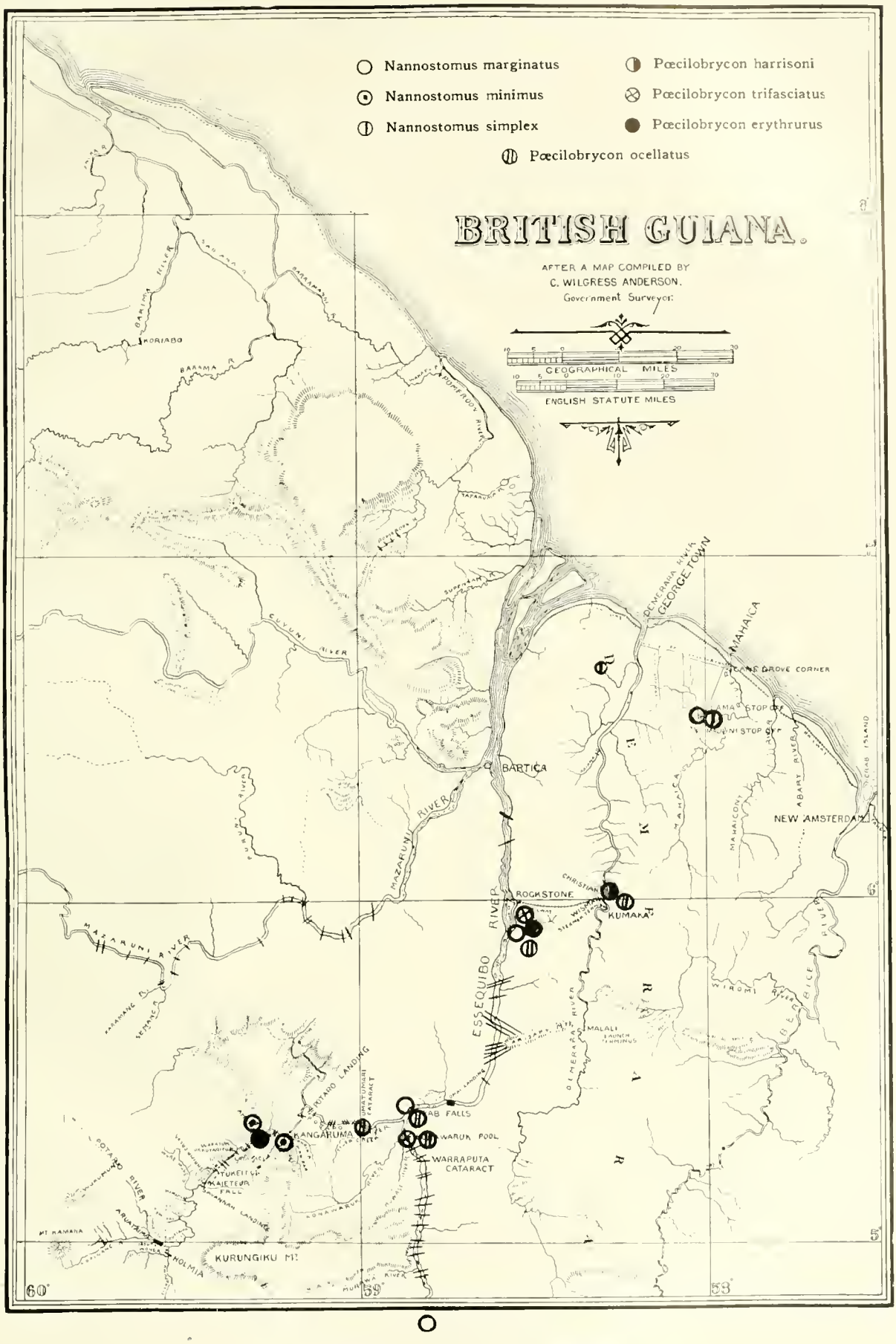

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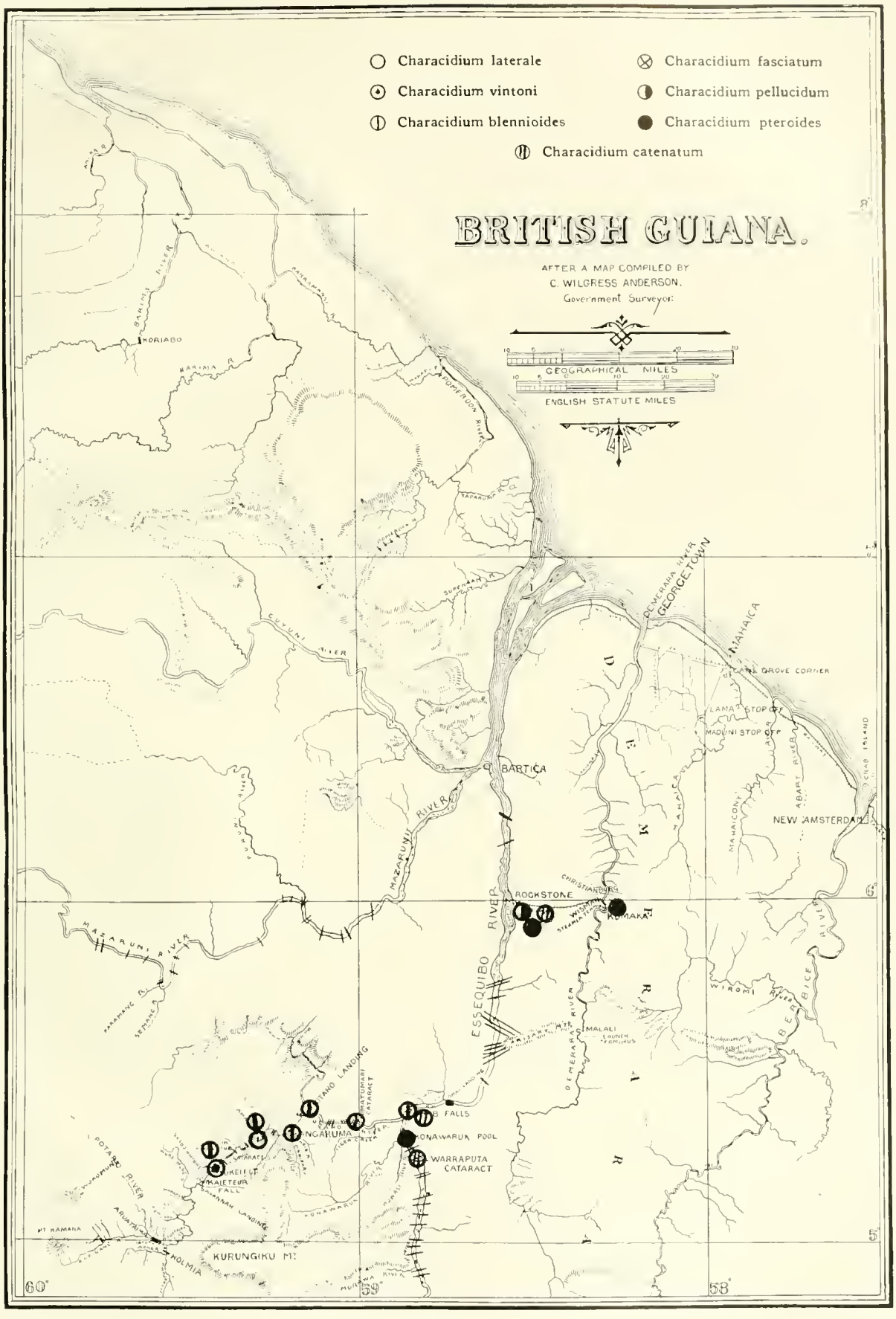

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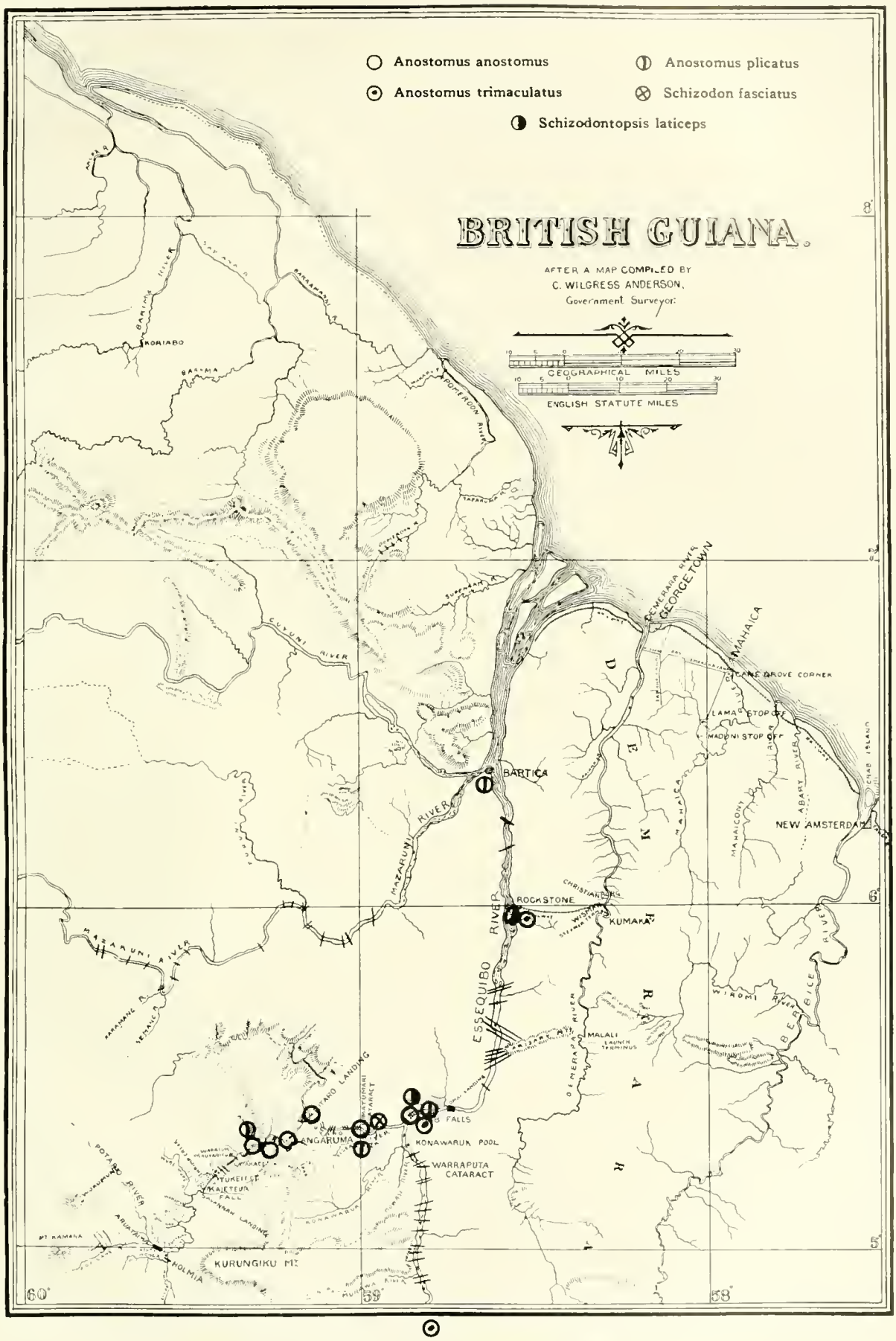

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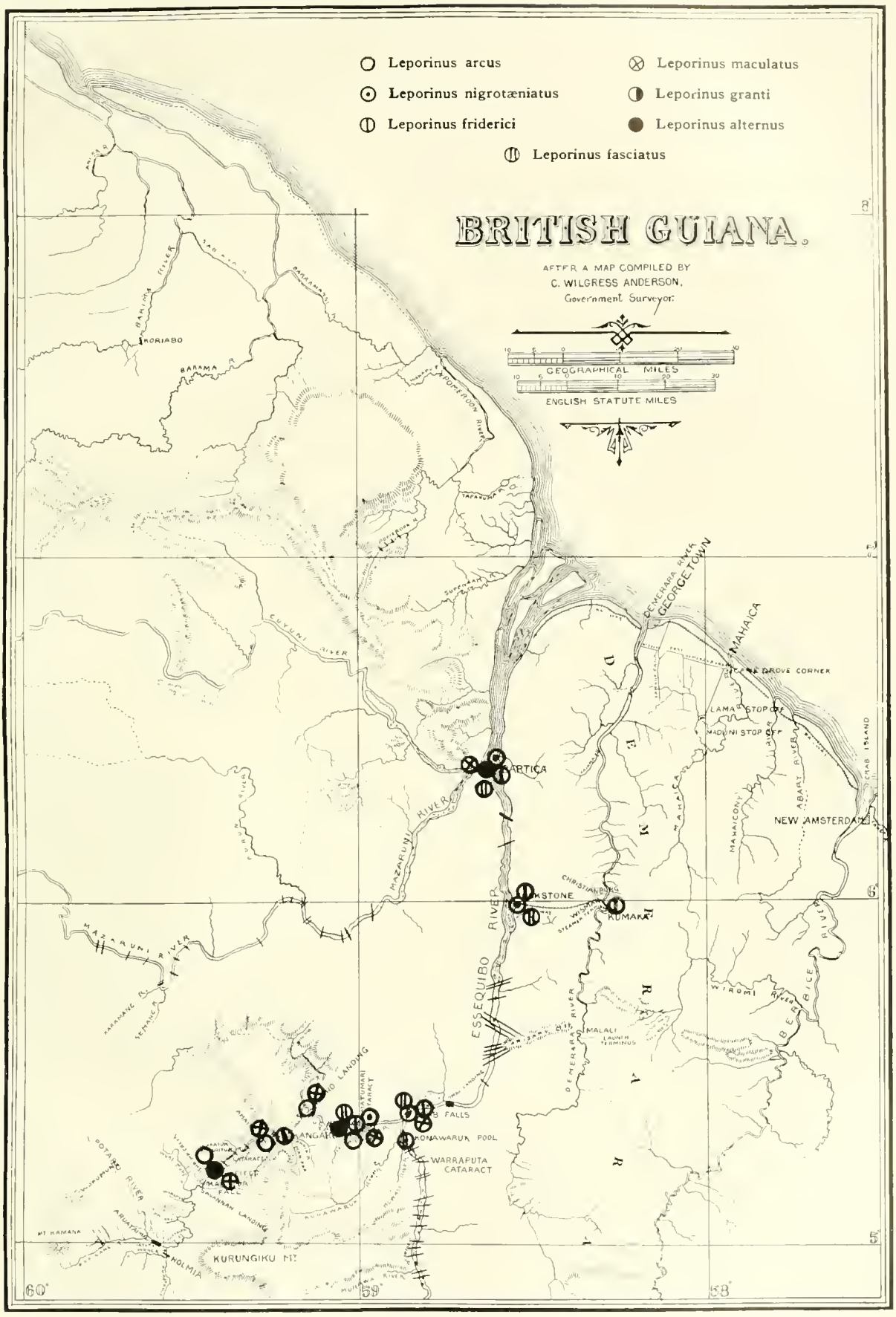

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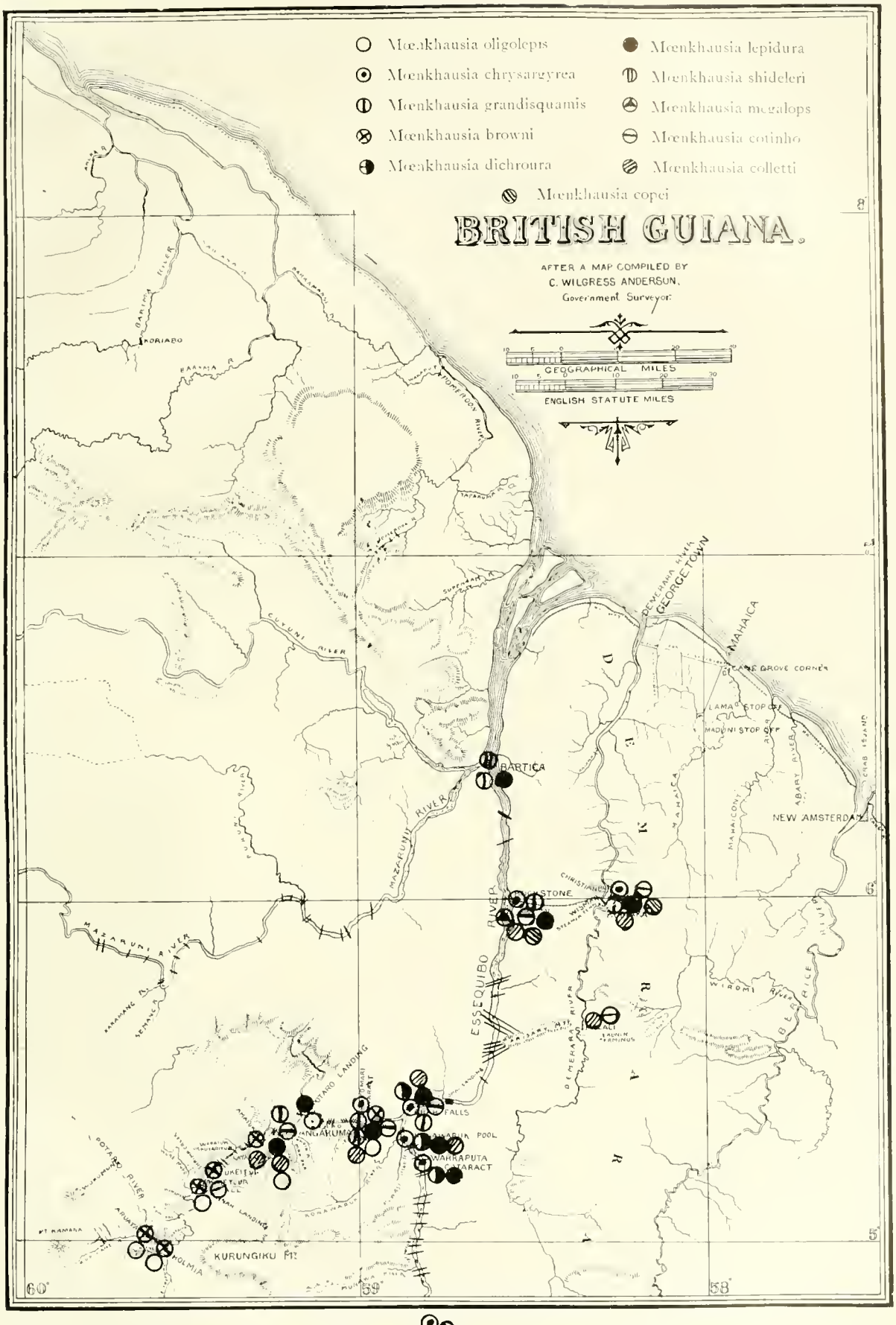

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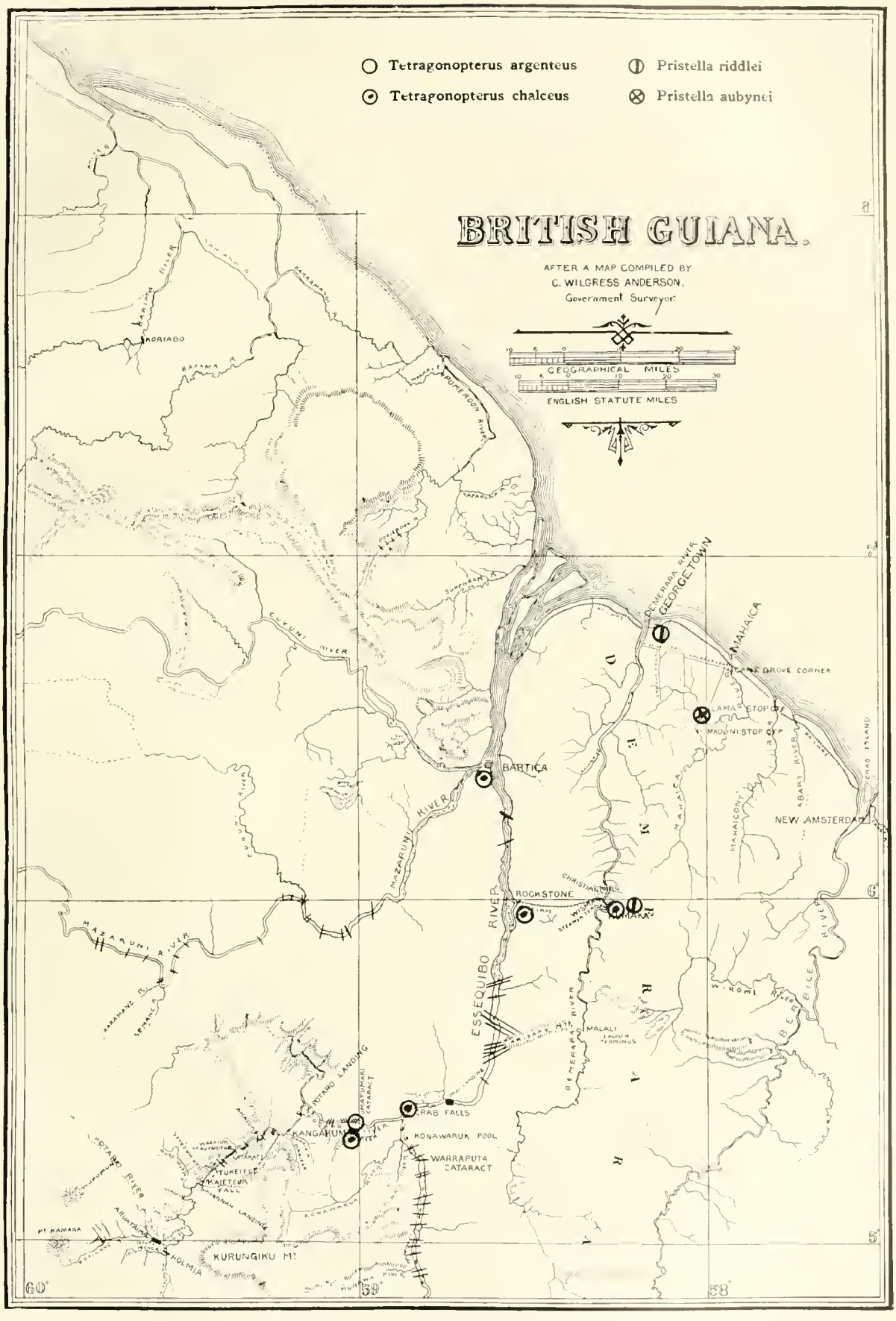

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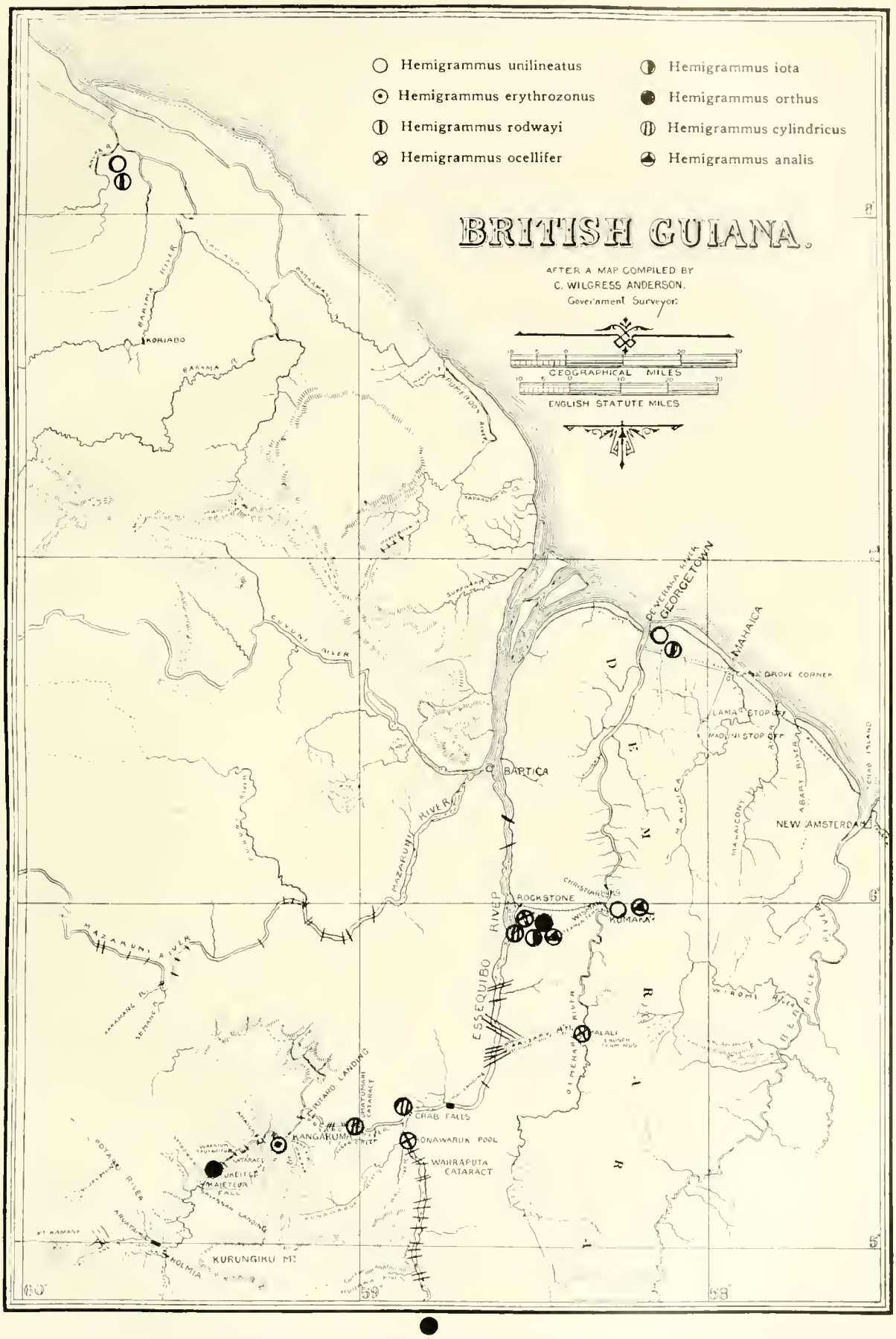

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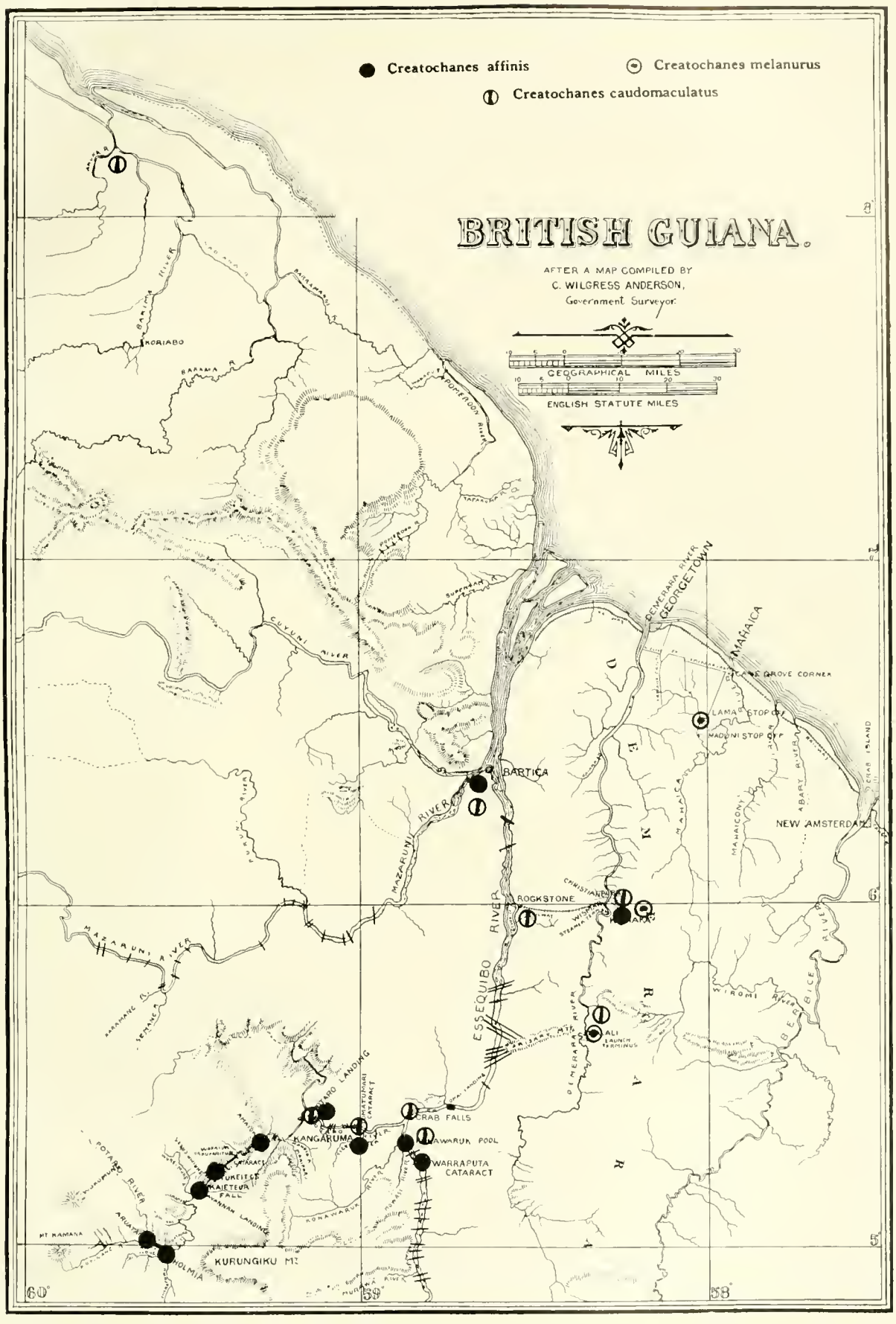

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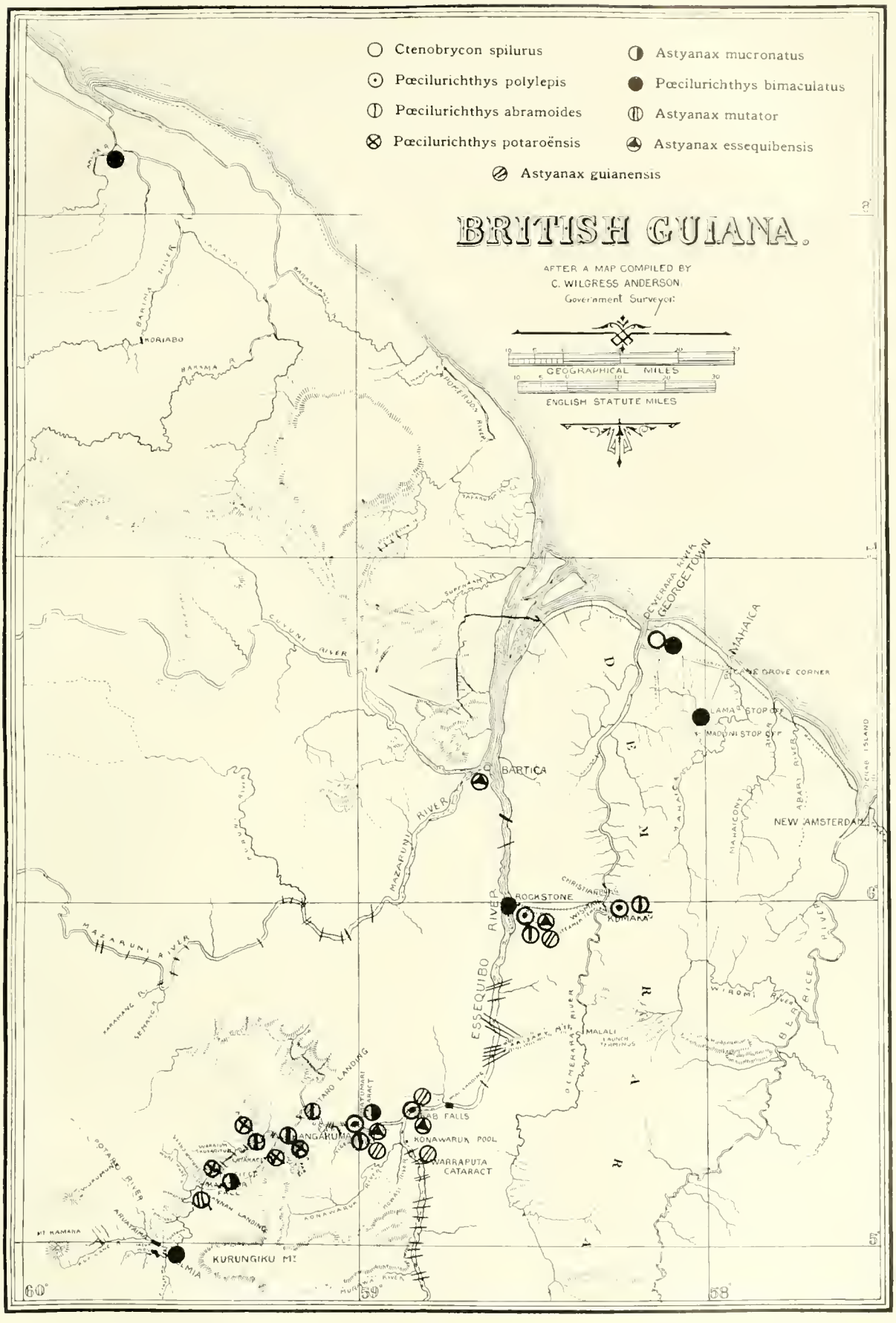

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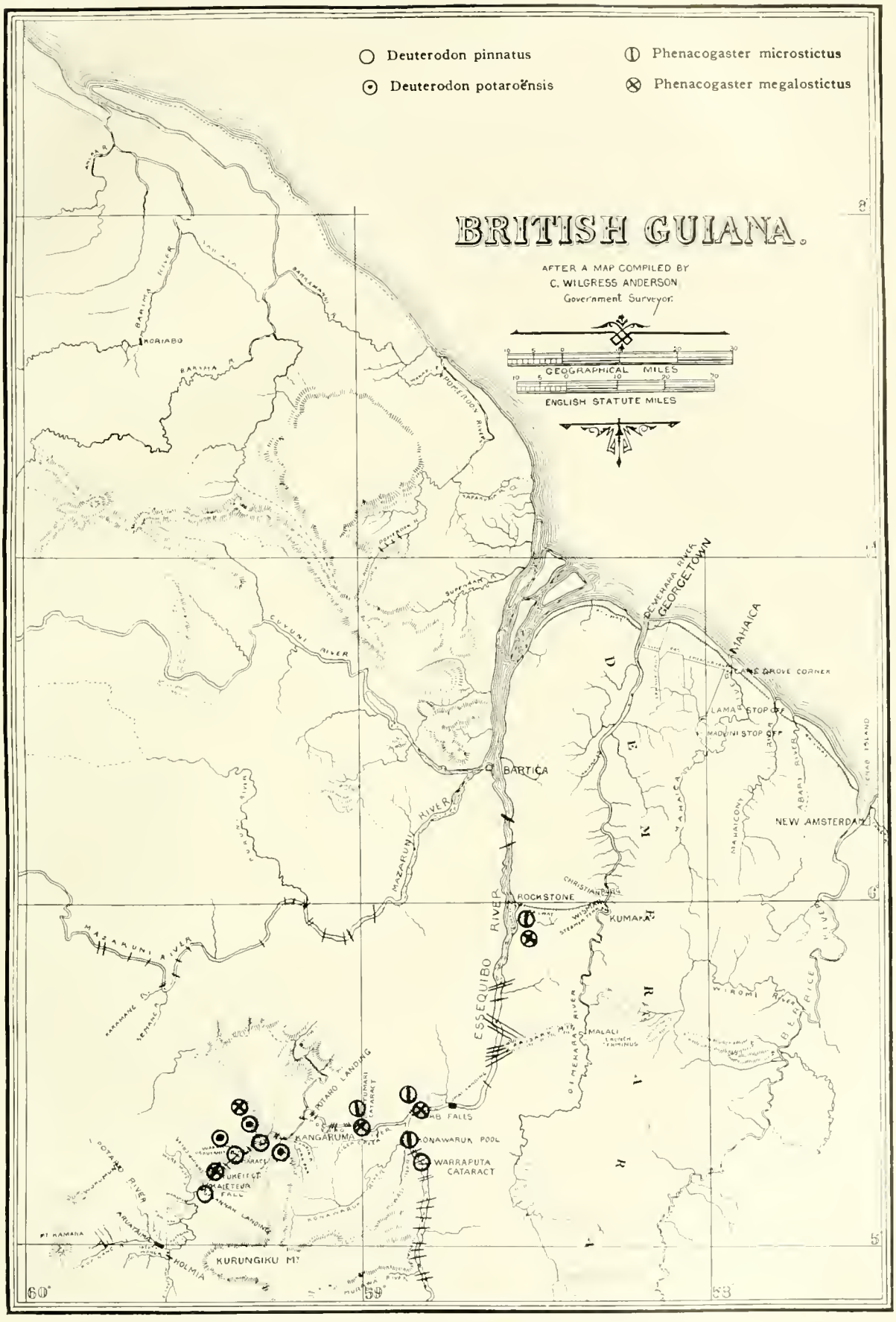

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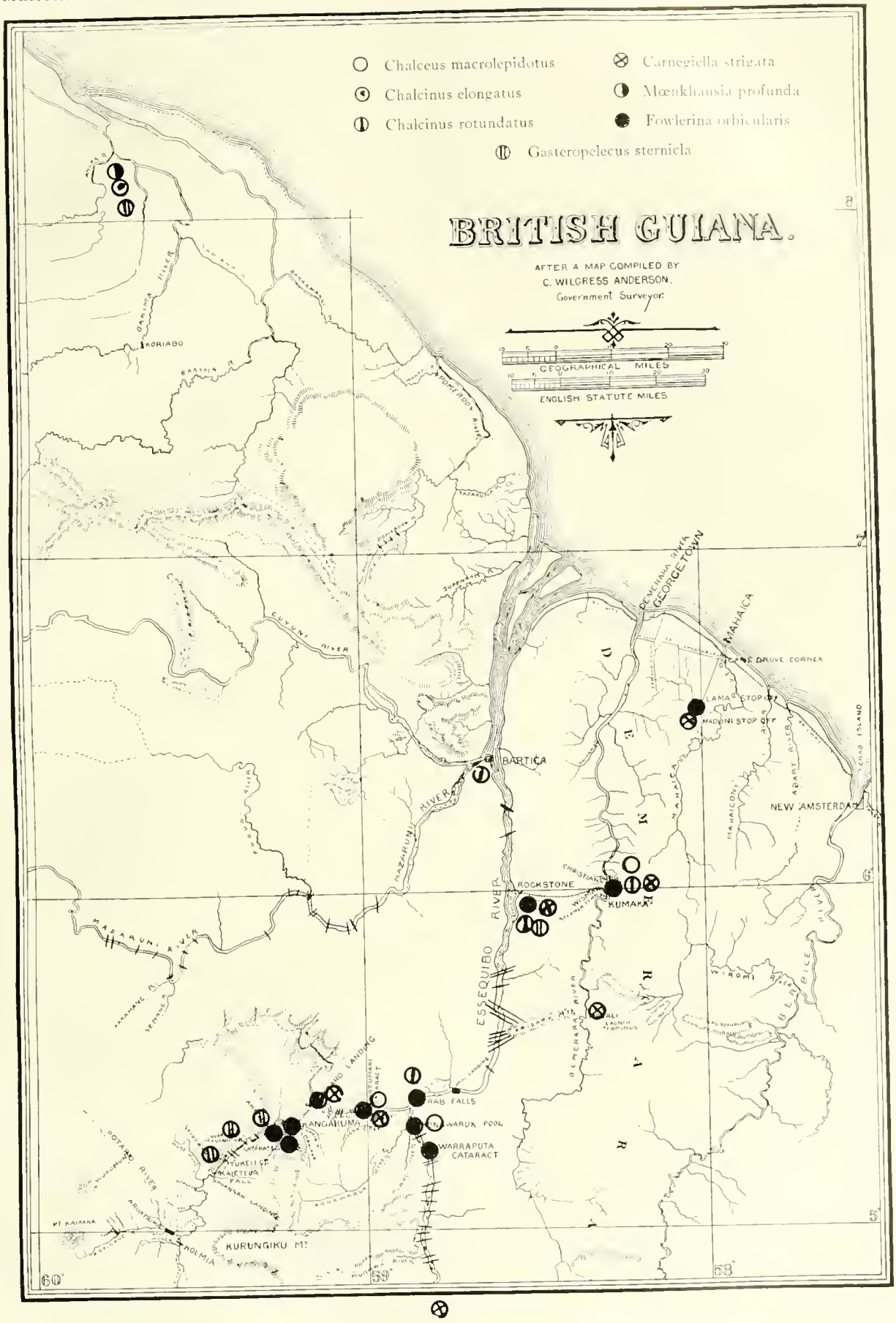

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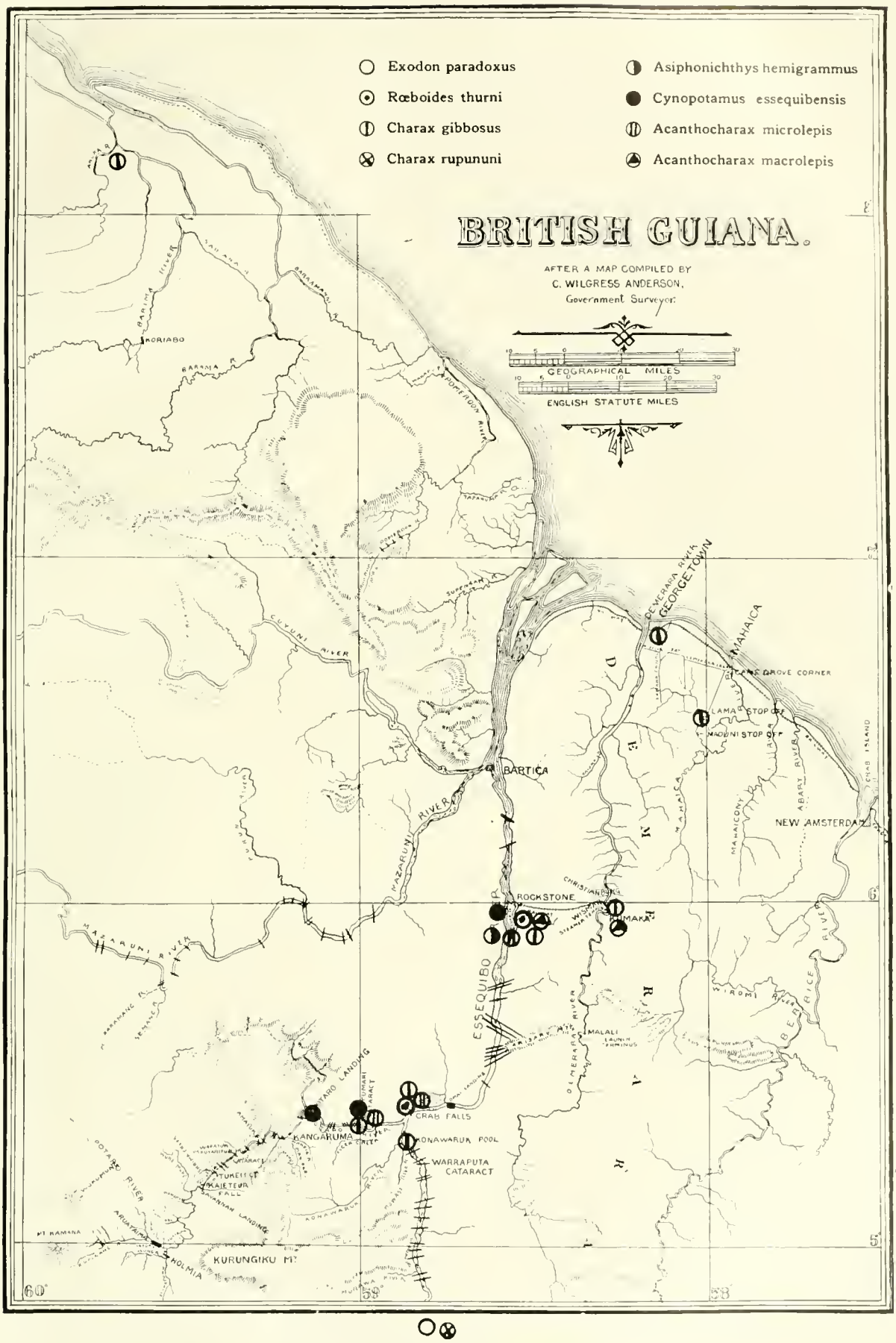

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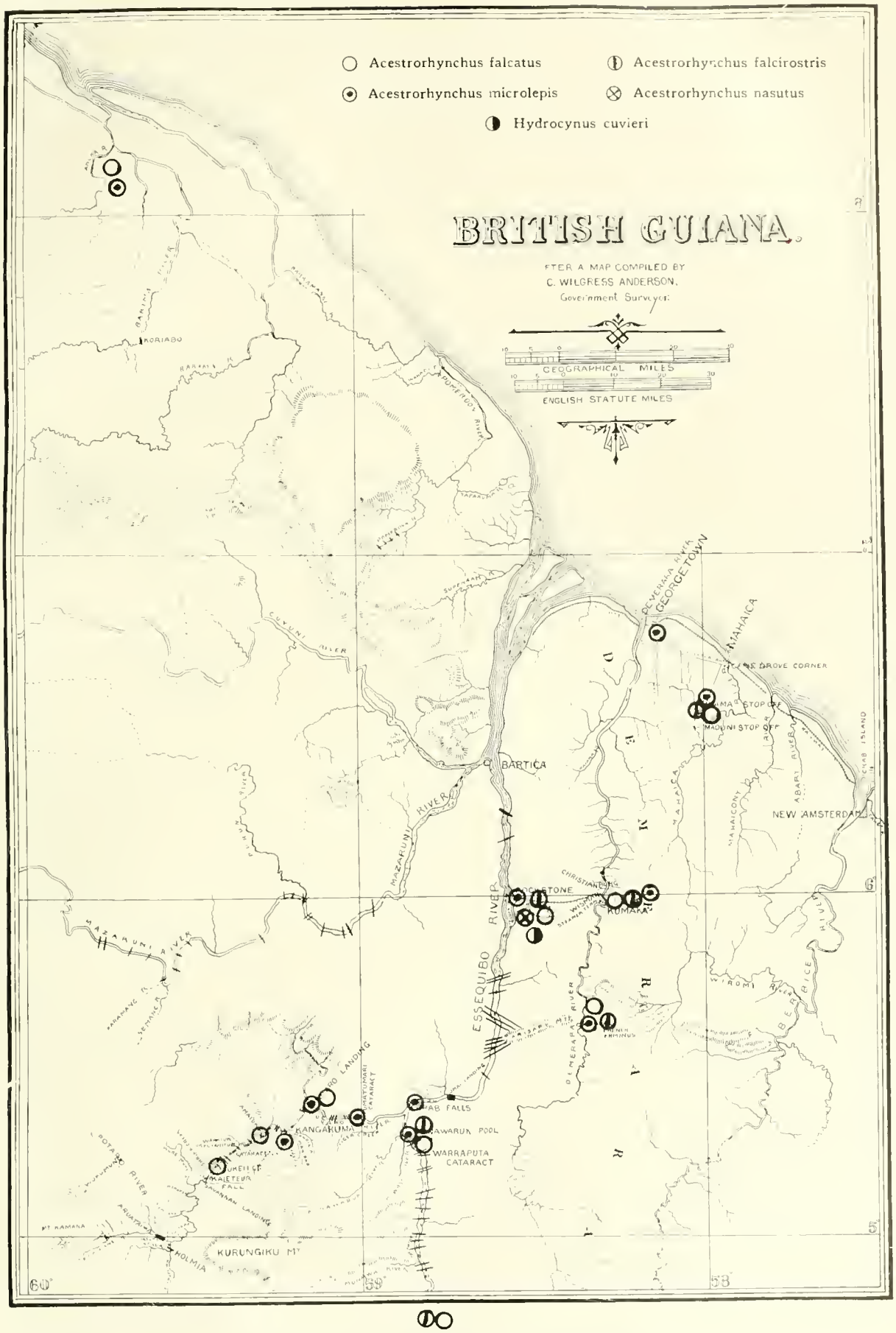

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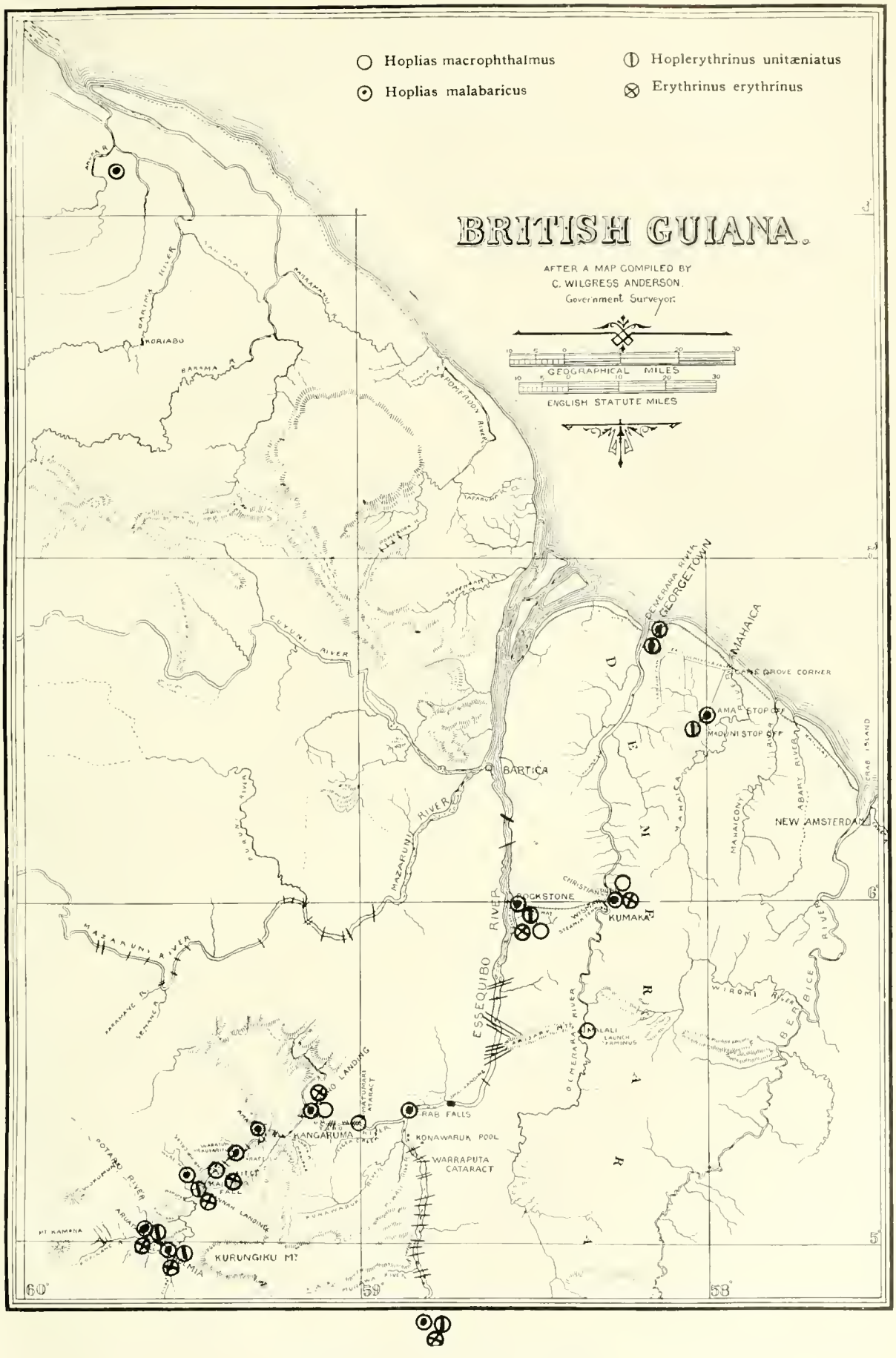

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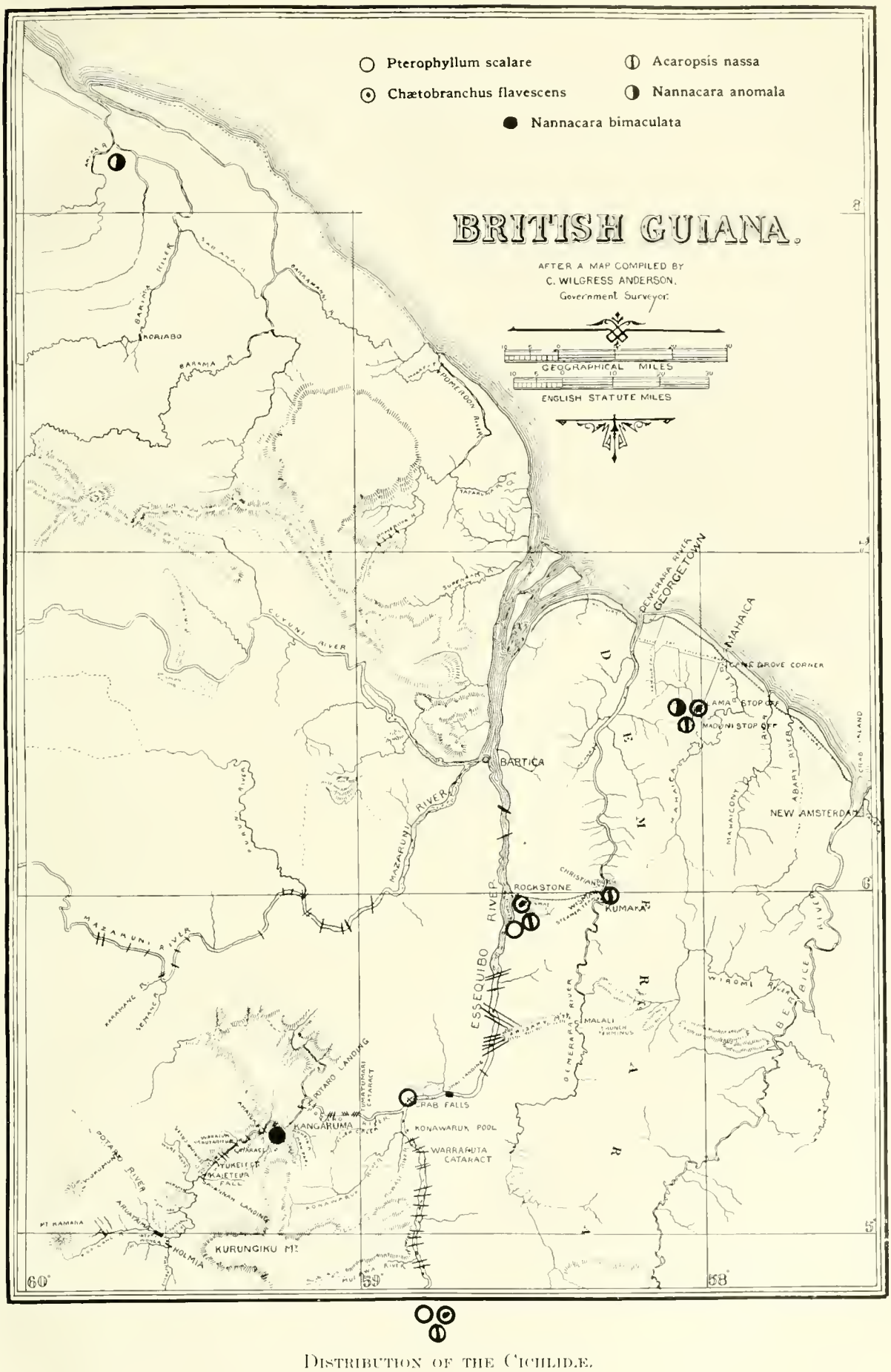

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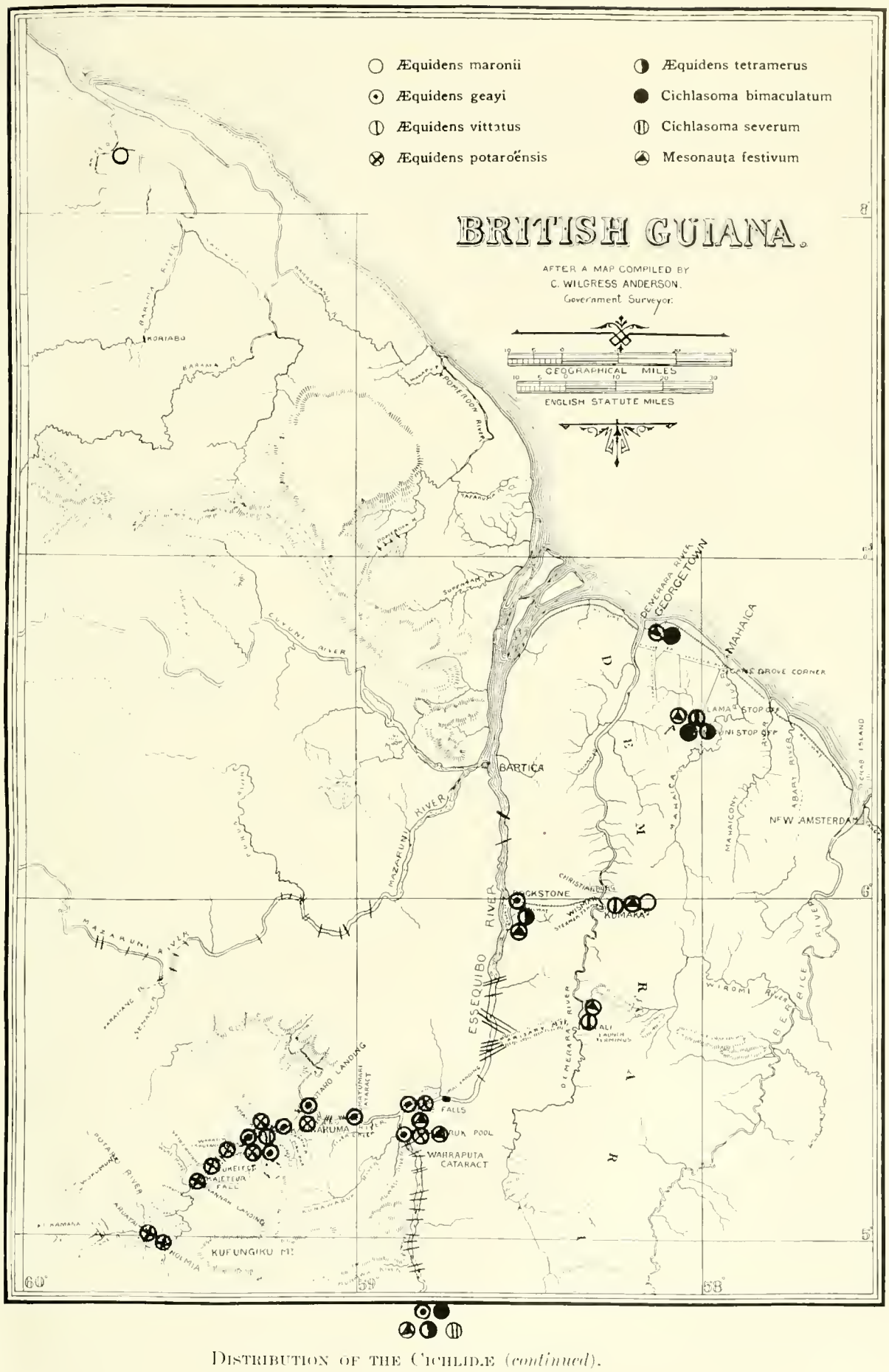

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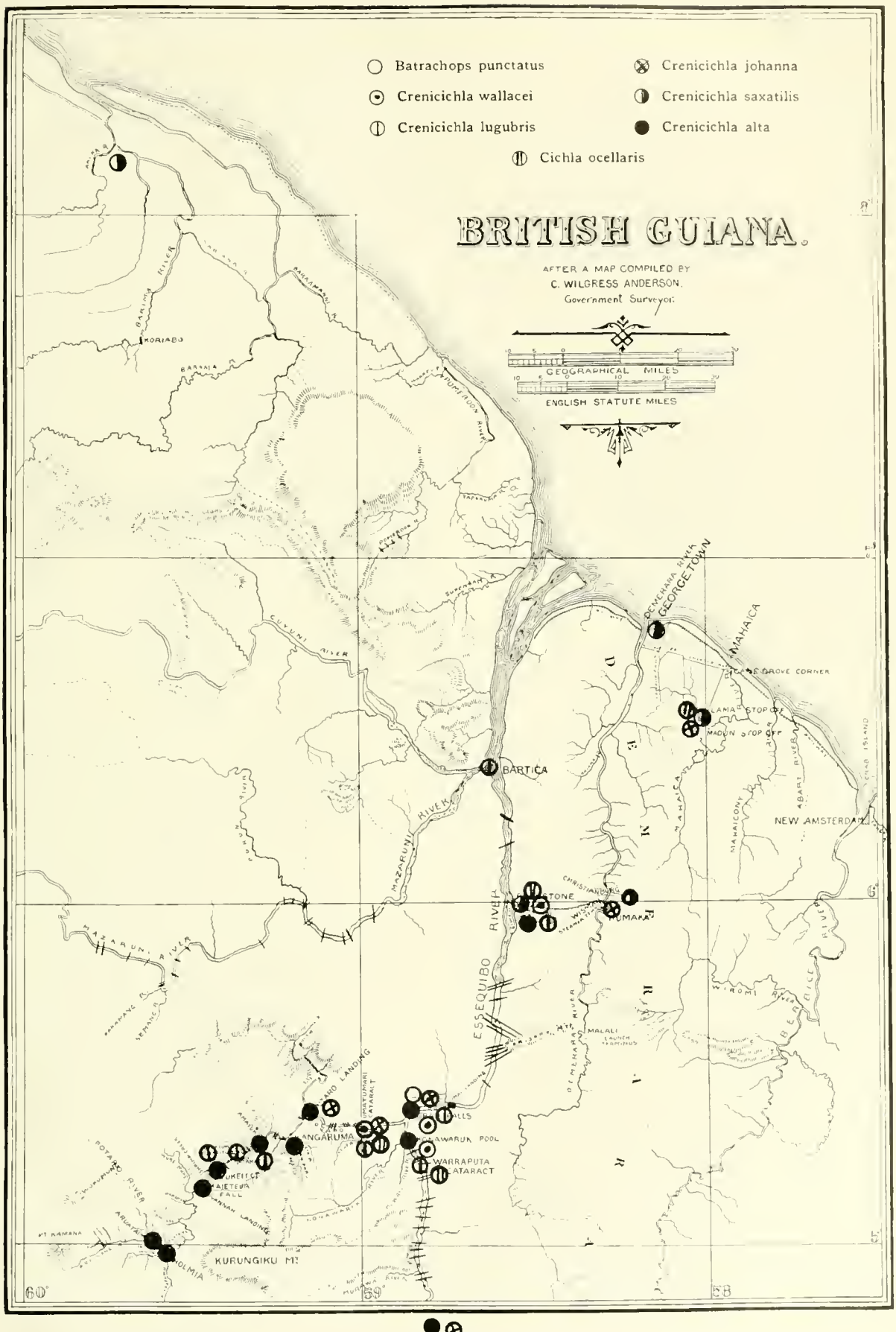

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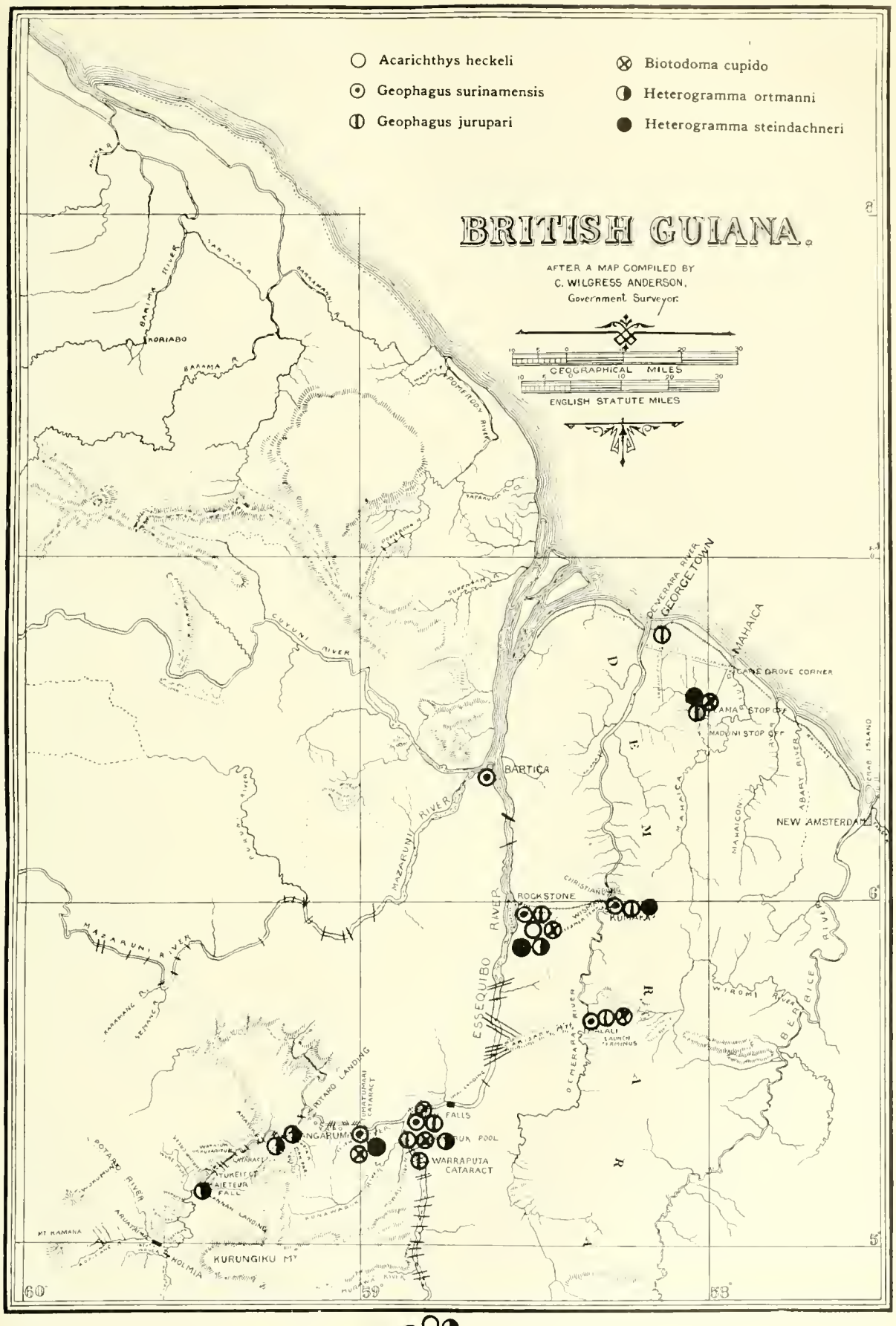

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